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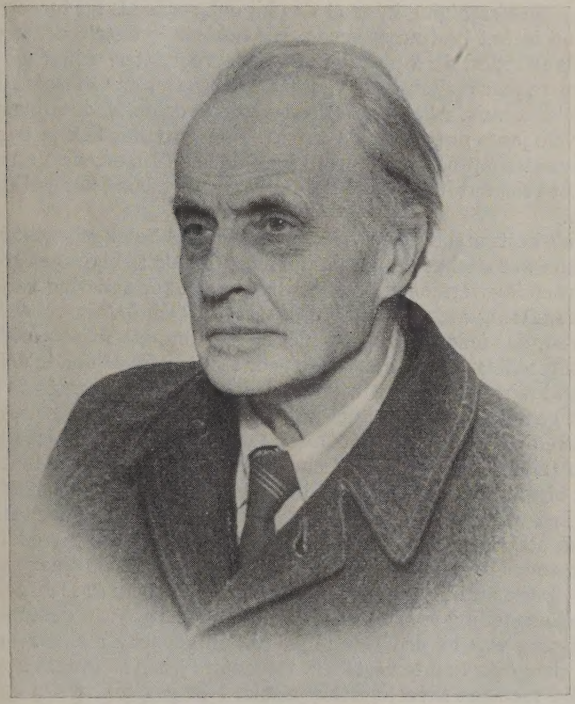
REDACTEUR: Dr R. A. MAAS GEESTERANUS * RIJKSHERBARIUM * LEIDEN



Dr H. A. A. VAN DER LEK
13 januari 1881–31 december 1955

Met het heengaan van Van der Lek verliest de Vereniging een van de mycologen van de oude garde, waaraan zij zeer veel heeft te danken, vooral in de beginperiode na de oprichting. In de latere jaren van zijn leven heeft Van der Lek zich teruggetrokken uit het actieve verenigingsleven, zodat vele van de jongere leden hem wellicht niet gekend hebben, maar tot zijn dood heeft hij belangstelling

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gehad voor de paddestoelen en zich o.a. beziggehouden met het schrijven van een nieuw paddestoelenboekje. De tekst daarvan is nog geheel gereedgekomen en het is te hopen, dat dit boekje binnenkort zal kunnen verschijnen.

Na in Utrecht biologie te hebben gestudeerd was Van der Lek enige tijd werkzaam op het Rijksherbarium te Leiden; daarna werd hij aangesteld aan het Instituut voor Phytopathologie en later aan het Laboratorium voor Tuinbouwplantenteelt te Wageningen.

De belangstelling voor paddestoelen en plantenziektenveroorzakende schimmels zat er reeds jong in, hetgeen o.a. blijkt uit een van zijn eerste publicaties, die handelt over de Nederlandse mycologische standaardcollectie in het Rijksherbarium (Med. Nederl. mycol. Ver. 3: 1–21. 1912). Kort na de oprichting van de Mycologische Vereniging in 1908 was hij ook reeds als lid toegetreden en in 1917 werd hij in het bestuur gekozen. Hij bekleedde daarin achtereenvolgens verschillende functies, nl. 2 jaar die van ondervoorzitter, 2 jaar die van secretaris, daarna 12 jaar opnieuw die van ondervoorzitter en ten slotte nog 14 jaar die van bibliothecaris. Als lid van de redactie voor de Mededelingen heeft hij gedurende vele jaren nuttig werk verricht. Toen Van der Lek in 1947 voor het bestuurslidmaatschap bedankte, werd hem door de Algemene Vergadering als blijk voor het vele, dat hij voor de Vereniging had gedaan, het erelidmaatschap aangeboden.

Behalve als bestuurslid heeft Van der Lek vooral betekenis gehad als schrijver. Zowel zijn wetenschappelijke als zijn meer populaire bijdragen getuigen van scherp waarnemingsvermogen; daarnaast van een bewondering van de natuur en een verwondering over de vele problemen, die zich daarin voordoen; ze zijn zo geschreven, dat iedereen ze met plezier leest en daarin proeft de diepe en warme belangstelling, die Van der Lek voor zijn onderwerp had. Vele artikelen van zijn hand zijn verschenen in de Mededelingen en in Fungus.

Het reeds genoemde Paddenstoelenboek, waarvan na de dood van Catharina Cool de latere drukken vrijwel uitsluitend door hem werden verzorgd, spreekt eveneens van zijn werkzame en critische geest. Het heeft in hoge mate bijgedragen tot het algemeen worden van de belangstelling in paddestoelen in ons land.

Van der Lek was een veelzijdig mens. Zijn belangstelling voor talen maakte, dat hij ook de scandinavische talen en Italiaans bestudeerde en op latere leeftijd nog Esperanto en Russisch leerde. Nog in zijn laatste levensjaar vertaalde hij een russisch boek op het gebied van de plantenveredeling. Daarnaast had hij een grote belangstelling voor muziek en andere facetten van de kunst.

In de omgang was hij een beminlijk, fijn en gevoelig mens en iemand, die altijd iets belangrijks had te vertellen. De laatste jaren kwam hij nogal eens bij ons aanlopen met een mycologische puzzle. Het gesprek kwam dan later op literatuur, op muziek, op kinderen en steeds was men na afloop van het gesprek rijker geworden en bleef ook na zijn vertrek veel stof over ter verdere overdenking en bespreking.

In Van der Lek is iemand heengegaan, die vele vrienden achterlaat, die hem niet zullen vergeten.

A. J. P. OORT

NOTES ON RESUPINATE HYMENOMYCETES—III[1]

M. A. Donk
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1. The genus *Sistotrema* Fr., as previously emended by the author, is briefly reviewed. The segregate *Trechispora* P. Karst. sensu D. P. Rog. is considered superfluous and the generic name itself appears misapplied.
2. The genus *Gloeocystidiellum* Donk is emended and discussed.
3. Three new genera are introduced and discussed, viz. *Tubulicrinis* Donk [type species, *Peniophora glebulosa* (Bres.) Sacc. & P. Syd.], *Laeticorticium* Donk (type species, *Corticium roseum* Pers.), and *Scytinostroma* Donk (type species, *Corticium portentosum* Berk. & C.).
4. *Langloisula* Ell. & Ev. should not be taken up to replace *Vararia* P. Karst., because it is apparently a nomen confusum.
5. New specific combinations are made under *Sistotrema* (6), *Gloeocystidiellum* (9), *Tubulicrinis* (14), *Laeticorticium* (5), and *Scytinostroma* (7).
6. The term 'paraphyses' is partly replaced by that of 'hyphidia.' For the type of cystidia by which *Tubulicrinis* is characterized the term 'lyocystidia' is introduced.

Introduction.—The following lines form an almost random choice from notes that I had already prepared for publication in 1940. They have been rewritten and brought up to date, but by no means cover the subject more or less exhaustively: several problems have been deliberately kept out and are reserved for future occasions.

The nomenclature of the resupinate Corticiaceae has been pushed towards the edge of chaos by the rejection of proposals to conserve the names *Corticium* Fr. and *Peniophora* Cooke. This has made it obligatory for those mycologists who want tot reat *Peniophora* sect. *Coloratae* Bourd. & G. as a distinct genus (as I do) to take up the name *Corticium* S. F. Gray (non Fr.) for it; to abandon *Peniophora* because it is a later synonym; and also to abandon *Corticium* Fr. for that vast collection of species that Bourdot & Galzin and other modern authors have brought together under that name. Taking up temporarily another, already existing name for that assemblage as well as for the rest of what has been called *Peniophora* and *Gloeocystidium* appears a highly unsatisfactorily solution to me for various reasons, and, hence, one is forced, perhaps prematurely, to isolate those groups that appeal as distinct and to provide them with generic names. There is little doubt that such a task will not be favourably received by many mycologists, but all the same a start must be made to provide a base for discussion.

In connection with some of the genera to be discussed below the current term 'paraphyses' has been dropped as far as the hymenomycetes are concerned: it is suggested that it is replaced by 'hyphidia' and, for instance, 'dichophyses' by 'dichohyphidia.' It should be pointed out that hyphidia, as I propose to apply that term, is to be restricted to hyphal elements, and not to include basidia and their derivatives, although intermediates do occur.

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[1] Part I was published *in* Reinwardtia **2**: 425–434. 1954, Part II, *in* Reinwardtia **3**: 363–379. 1956.

SISTOTREMA Fr. *emend.*

Sistotrema Fr., Syst. mycol. **1**: 426. 1821; emend. Donk *apud* D. P. Rog. *in* Univ. Iowa Stud. nat. Hist. **17**: 19. 1935; not *Sistotrema* Pers. *ex* Pers., Mycol. europ. **2**: 191. 1825 (Polyporaceae).

Hydnotrema Link, Handb. Gewächse **3**: 298. 1833. — Type species (only original species): *Sistotrema confluens* Pers. ex Fr. — Apparently a name change for *Sistotrema* Fr. 1821 (non Pers.).

Heptasporium Bref., Unters. **14**: 167. 1908; **15**: 111. 1912. — Type species (only original species): *Heptasporium gracile* Bref. = (presumably) *Sistotrema brinkmanni* (Bref.) John Erikss.

Corticium sect. *Urnigera* Bourd. & G. *in* Bull. Soc. mycol. France **27**: 243. 1911 (as "Groupe"); Hym. France 235. [1928]. — Types species (selected): *Corticium octosporum* J. Schroet. ex Höhn. & L. = *Sistotrema brinkmanni* (Bres.) John Erikss. according to Rogers *in* Mycologia **36**: 88. 1944 (as *Trechispora*).

Gloeocystidium sect. *Urnigera* Bourd. & G., Hym. France 264. [1928]. — Type species (only original species): *Gloeocystium coroniferum* Höhn. & L.

Poria sect. *Urnigera* Donk, Rev. niederl. Homob.-Aphyll. **2**: 220. 1933. — Type species (selected); *Poria albopallescens* Bourd. & G. = *Sistotrema muscicola* (Pers.) Lundell according to Lundell *in* Lund. & Nannf., Fung. exs. suec. Fasc. 29–30: 11 no. 1415a. 1947.

Misapplication.—*Trechispora* P. Karst. *sensu* D. P. Rog. & Jacks. *in* Farlowia **1**: 328. 1943; D. P. Rog. *in* Mycologia **36**: 73. 1944.

The main features of the genus are (i) the basidia which pass through, or finally assume, a highly characteristic urn-shaped stage and (ii) in most species have 4–8 (mostly 6) sterigmata; (iii) the usually clamped hyphae (often with onion-like inflations); and (v) the fragile, white or pale fruit-bodies (resupinate in most species) which are neither frankly waxy, nor gelatinous or mucous. It is closely related to *Cristella* Pat. emend. Donk.

TYPE SPECIES (only original species).—*Sistotrema confluens* (Pers.) ex Fr.

EXAMPLES.—

Sistotrema albolutea (Bourd. & G.) Bondarz. & Sing. *in* Ann. mycol., Berl. **39**: 47. 1941; *S. brinkmanni* (Bres.) John Erikss. *in* K. fysiogr. Sällsk. Lund Förh. **18** (8): 17. 1948; *S. communis* John Erikss. *in* Svensk bot. Tidskr. **43**: 312. 1949; *S. confluens* (Pers.) ex Fr.; **Sistotrema coroniferum** (Höhn. & L.) Donk, *comb. nov.* (basinym, *Gloeocystidium coroniferum* Höhn. & L. *in* S.B. Akad. Wien, M.-n. Kl. I **116**: 823. 1907); **Sistotrema diademiferum** (Bourd. & G.) Donk, *comb. nov.* (basinym, *Corticium diademiferum* Bourd. & G. *in* Bull. Soc. mycol. France **27**: 244. 1911); **Sistotrema hirschii** (Donk) Donk, *comb. nov.* (basinym, *Corticium hirschii* Donk *in* Meded. Nederl. mycol. Ver. **18–20**: 139. 1931); *S. muscicola* (Pers.) Lundell *in* Lund. & Nannf., Fungi exs. suec. Fasc. 39–40: 11 no. 1415a. 1947; **Sistotrema niveocremeum** (Höhn. & L.) Donk, *comb. nov.* (basinym, *Corticium niveocremeum* Höhn. & L. *in* S.B. Akad. Wien, M.-n. Kl. I **117**: 1117. 1908); *Poria onusta* (P. Karst.) Sacc. sensu Bourd. & G.; **Sistotrema raduloides** (P. Karst.) Donk, *comb. nov.* (basinym, *Hydnum raduloides* P. Karst. *in* Medd. Soc. F. F. fenn. **9**: 110. 1883); **Sistotrema sernanderi** (Litsch.) Donk, *comb. nov.* (basinym, *Gloeocystidium sernanderi* Litsch. *in* Svensk bot. Tidskr. **25**: 437. 1931); *S. subtrigonospermum* D. P. Rog.; ? *Corticium suecicum* Litsch. *apud* Lundell *in* Lund. & Nannf., Fungi exs. suec. Fasc. 9–10: 24 no. 464. 1937 (name apparently not yet validly published: neither an accompanying Latin description nor a reference to such a description).

The authors' names put after *Sistotrema* are often 'Pers. ex Fr.,' but this is not correct. Persoon (*1794*: 108) introduced a genus *Sistrotrema* with two species, *Sistotrema confluens* Pers. (*Hydnum sublamellosum* Bull.) and *S. cinereum* Pers. [*Daedalea unicolor* (Bull.) ex Fr. = *Coriolus unicolor* (Bull. ex Fr.) Pat.]. Without hesitation I select this second species as the type of Persoon's generic name: its description agrees better with the original generic description, which contains "Pileo suberoso," the substance of this species being given as "suberosum." Originally the substance of *S. confluens* was not defined, but afterwards (Persoon, *1801:* 551) it was given as "Substantia carnosa, mollis." In

other respects, too, *S. cinereum* agrees best with the original description. When after the starting-point date, Persoon (*1825:* 191) dealt with his own genus, the taxon had expanded to one of 30 species and the generic description states "Pileus coriaceus," which again conflicts with *S. confluens* ("pileo carnoso")!

When Fries (*l.c.*) needed a genus for *S. confluens*, he emphatically rejected Persoon's name and called the genus "*Sistotrema*. Fries... ab homonymo genere Persoonii diversum; cum vero ad hoc relatum fuit ejusque species [alibi] disposui, nomen retinendum putavi." (And compare Fries *1825:* 362!) Link (*l.c.*), for his time, acted quite to the point when he censured Fries by retaining *Sistotrema* Pers. and coining the name *Hydnotrema* Link for *Sistotrema* Fr.

The present emendation of *Sistotrema* Fr. (non Pers.) was proposed many years ago by Donk (*apud* Rogers, *1935:* 19). Its species were retained by Bourdot & Galzin (*1928*) in five different genera, because these authors did not want to deviate from Patouillard's scheme of genera. However, there is reason to believe that in the opposite case they would have put them already together in one genus. The emendation has been accepted by some mycologists, like Rogers (*1935:* 19), Bondarzew & Singer (*1941:* 47), Lundell (*1947a*), and Eriksson (*1948:* 17).

Modern authors have placed the species in the following genera: *Sistotrema*, *Poria* Pers. ex S. F. Gray, *Grandinia* Fr. emend. Bourd. & G., *Odontia* Fr., *Hypochnus* Fr. ex Fr., *Corticium* Fr. (non S. F. Gray), and *Gloeocystidium* P. Karst. sensu Höhn. & L. A new genus was instituted for a single species, viz. *Heptasporium* Bref. This is another nice example of the Friesian classification failing convincingly to accomodate properly the contents of a taxon, in which the configuration of the fertile surface and shape of the fruit-bodies are highly variable, even within the limits of one species. For instance, in *S. muscicola* the fruit-body ranges from resupinate to substipitate and the hymenium from toothed to tubulose, and in *S. brinkmanni* the hymenium, from even to toothed.

There is increasing support for the view that the genus as here conceived is a natural one and hard to subdivide, although Rogers (*1944:* 70–99 fs. 1–11) has attempted to separate the resupinate species as a distinct genus from the pileate ones, the latter group containing *Sistotrema confluens*. Lundell (*1947a*) has already criticized this procedure in connection with *S. muscicola*, a species he believes to vary from resupinate to pileate, even showing tendencies of becoming laterally stipitate. If one wants to subdivide the genus (rather than to divide it into genera), the general structure of the fruit-body might possibly yield satisfactory criteria.

In many respects *Sistotrema* is closely related to *Cristella* Pat. as emended to cover the several of Bourdot & Galzin's '*Humicola*' groups. It differs in its typical urn-shaped basidia, generally bearing more than four sterigmata. *Galzinia* Bourd. has basidia which remind one of those of *Sistotrema* because there is a typical probasidium that sends out an elongation forming the spores terminally (metabasidium). However, that elongation is of variable and often considerable length and may arise laterally from the probasidium. These differences might perhaps be explained by the differences in consistency of the fruit-body, which is waxy to gelatinous or mucous in *Galzinia*. The basidia are clustered, as in *Sistotrema*, arising similarly from ascending branches, but as in *Cristella* the number of spores per basidium does not exceed four. Rogers

(*1944:* 99–103 fs. 12–14), who has carefully studied *Galzinia*, says that the spores do not exhibit repetition. Bourdot & Galzin (*1928:* 339 f. 106) did not state anything in this regard, but they drew a figure of *G. pedicellata* Bourd. in which one spore bears a small, conidium-like outgrowth. If their species has been correctly interpreted by Rogers, we may safely assume that this is exceptional, if not an error, to be ignored until it is definitely established as typical. Such an assumption should remove from *Galzinia* the suspicion that it might be 'heterobasidious'; and make it more safely and directly comparable to *Sistotrema*.

Corticium niveocremeum Höhn. & L. and *C. suecicum* Litsch. [*Corticium calceum* (Fr.) Fr. sensu Bourd. & G.], referred by Bourdot & Galzin to *Corticium* sect. *Urnigera*, are believed by Rogers (*1944:* 95–99) to be out of place here, because their basidia do not pass through the developmental stages characteristic of *Sistotrema*, although the mature basidia of the two species mentioned may be constricted and, therefore, appear urniform. In certain features these species strongly remind one of the present genus, for instance in the clusters of obovate immature basidia, at maturity producing more than four sterigmata, and often originating from proliferative clamps. As by many of their characters they closely resemble *Sistotrema*. I would prefer, for the moment, to treat them as species of that genus.

Apart from these two fungi, the number of not yet satisfactorily classified corticiums with more than four sterigmata per basidium is comparatively low. One is reminded in this connection of (i) certain species of *Botryobasidium* Donk; (ii) of "*Corticium*" *subinvisible* D. P. Rog., "*C.*" *delicatissimum* H. S. Jacks., and three species of the "*Peniophora*" *rimicola* (P. Karst.) Höhn. & L. group; and (iii) of "*Corticium catonii* Burgeff." [1] Species of the second group, with non-urniform basidia with five to seven sterigmata, seem to belong to a series of fungi not yet properly classified, but presumably not closely related to *Sistotrema*.

However remarkable the urn-shaped basidium may look, it should evidently not be overemphasized as a taxonomic character: it seems to be of not more than at most of generic value. Some points of agreement with this basidial type in what might prove to be related groups may be mentioned in this connection. In a rather clear-cut section of *Botryobasidium* Donk (= *Pellicularia* Cooke sensu D. P. Rog.) the subcylindric basidia are often somewhat ventricosely inflated in their basal portion (cf. Rogers, *1943:* 118 f. 7) and often cylindric, but slightly constricted at or near the middle, while the number of their sterigmata averages six! When describing *Sistotrema commune* John Erikss. (typically with clamps), its author differentiated a form without clamps. "Hence," he said, "it resembles *Pellicularia pruinata* (Bres.) Rogers that has also wide hyphae and more than four sterigmata. The basidia of *P. pruinata* are sometimes slightly constricted but never so distinctly urniform as in the fungus dealt with here." This may be taken as a suggestion that a not too remote relationship would exist between *Botryobasidium* and *Sistotrema*, a

[1] See Burgeff (*1936*: 140 fs. 139–141). This is a provisional name, as emphatically stated by Burgeff, given to a fungus isolated from a species of *Cypripedium*. The basidia were drawn as clavate. In this connection it may be mentioned that *Sistotrema brinkmanni* s. lat. is supposed to include also an orchid symbiont, *Corticium masculi* Sprau (*1937*).

suggestion which, in my opinion, deserves serious consideration. "*Pellicularia*" *digitata* D. P. Rog. (*apud* Martin *1944: 72* f. 10), another species of *Botryobasidium*, has basidia "at first stout-obovate, at maturity with ventricose base and narrowed subcylindric apical portion." Keeping in mind that *Sistotrema* and *Cristella* are mutually closely related the following remark is also of interest in this connection: "In spore-ornamentation, in possession of cords, and in mycelium more delicate than that of most species of *Pellicularia*, ["*P.*" *chordulata* D. P. Rog.] approaches *Corticium* sect. *Humicola* of Bourdot & Galzin."—Rogers (*1943:* 99).

All these indications when accumulated tend to support the conclusion that *Cristella* and *Sistotrema* may be related to a series of genera of which *Botryobasidium* and *Ceratobasidium* D. P. Rog. are outstanding examples. The latter are often considered 'heterobasidious' because the spores exhibit repetition (in *Botryobasidium* only in some of its species now excluded to form the genera *Uthatobasidium* Donk and *Thanatephorus* Donk, *1956*), and undoubtedly related on one side, through *Ceratobasidium*, to *Tulasnella* J. Schroet. Of *Sistotrema* or *Cristella* no repetition of spores has ever been reported in any species as far as I am aware.

The plasticity of certain taxa, mentioned among the examples above as species, is enormous, and up till the present no suggestions have been brought forward which would satisfactorily enable their division into the smaller species that are suspected to exist. This applies in particular to *S. brinkmanni*, which has been conceived by Rogers (*1944:* 88–94) as to include, for instance, *Odontia brinkmanni* Bres., *Corticium coronilla* Höhn., and *Corticium octosporum* J. Schroet. ex Höhn. & L., all formerly kept apart by Bourdot & Galzin and some of their disciples.

For a variable species like *S. muscicola* the situation may perhaps be different in so far as its plasticity is rather due to environmental conditions than to genetical differentiation. Lundell (*1947a*) now includes in it, apart from the original *Hydnum muscicola* Pers., also *Sistotrema sublamellosum* subsp. *ericetorum* Bourd. & G. [*Sistotrema ericetorum* (Bourd. & G.) Wakef.] and *Poria albopallescens* Bourd. & G. [*Sistotrema albopallescens* (Bourd. & G.) Bondarz. & Sing.].

Cotylidia vitellina (Plowr.) Lundell was erroneously incorporated in *Sistotrema*, a procedure already rectified by Lundell himself (*1941; 1947b*).

It has been mentioned above that Rogers (*1944*) segregates the resupinate species under the name *Trechispora* P. Karst., which is based on a single species, *T. onusta* P. Karst. This species has been differently interpreted. First, Bresadola (*1908:* 41) reported that material from Karsten himself was a mixtum compositum of a smooth-spored species of *Poria* ("Sporae... minutissime asperulatae vel laeves") and a fungus with aculeolate conidia, 4×3–4μ in diameter which perhaps were taken for the spores of the former by Karsten. If this view were correct the generic as well as the specific name had better be rejected in agreement with the Code, because the characters were derived from two entirely discordant elements supposed to make up a single 'individual' fungus (Art. 76; nomen confusum). The poria that Bresadola studied is the one with urniform basidia which was also described by Bourdot & Galzin (*1928:* 658) and Rogers (*1944:* 80 f. 1).

Secondly, Rogers (*1944:* 75–76), too, considered Karsten's species to be smooth-spored but ignored the aculeolate conidia which Bresadola had noticed; the latter were absent in the specimen that Rogers studied and which he originally selected as the type. Because the character of the rough spores induced Karsten to establish the genus and even to call it after them, this second interpretation appears highly questionable, and, in my opinion, incorrect.

Thirdly, Lowe (*1956:* 123) stated that Karsten's species is identical with *Poria candidissima* (Schw.) Sacc., "according to the Lectotype selected from a Karsten collection at the New York Botanical Garden by D. P. Rogers, a portion of which is now at Helsinki. This collection is the only one known which agrees with the original description, which stated that the spores were echinulate." This solution would seem to be fully acceptable, and confirms other cases for which it is recorded that Karsten confused outwardly similar but different fungi. The conclusion reported by Lowe is also consistent with an earlier one by Donk (*1933:* 217), who stated that *Trechispora onusta* belonged to *Poria* sect. *Subtiles* Bourd. & G. emend. Donk, a taxon including *Poria candidissima* and from which he removed the species with urniform basidia (among which was *Poria onusta* sensu Bourd. & G.).

If one accepts this third interpretation of *Trechispora onusta*, it follows that this specific name must be reduced to the synonymy of *Poria candidissima*, which has non-urniform basidia with never more than four spores. It also follows that the generic name *Trechispora* is not available for the genus to which Rogers applied it; it is a later synonym of *Cristella* Pat., for those mycologists who accept that genus in an emended circumscription, inclusive of certain species of *Poria*. Finally, the species currently called *Trechispora onusta* or *Poria onusta* appears to be without a correct name. Some might prefer to reject *Trechispora* P. Karst. as impriorable because it is a later homonym of *Trachyspora* Fuck. (1861; Uredinales).

GLOEOCYSTIDIELLUM Donk *emend.*

Gloeocystidium sect. *Amyloidea* Bourd. & G. *in* Bull. Soc. mycol. France **28**: 355. [1913] (as "Groupe"); Hym. France 251. [1928]. — Type species (selected): *Gloeocystidium porosum* (Berk. & C.) Wakef. sensu Wakef.

Gloeocystidium sect. *Ceracea* Bourd. & G., Hym. France 256. [1928], in part. — Type species (selected): *Gloeocystidium lactescens* (Berk.) Höhn. & L.

Gloeocystidium sect. *Insidiosa* Bourd. & G., Hym. France 265. [1928]. — Type species (selected): *Gloeocystidium insidiosum* Bourd. & G.

Gloeocystidium [sect.] *Ceracea* Killerm. *in* Engl. & Pr., Nat. PflFam., 2. Aufl., **6**: 140. 1928, in part. — Type species (selected): *Gloeocystidium lactescens* (Berk.) Höhn. & L.

Gloeocystidium [sect.] *Furfuracea* Killerm. *in* Engl. & Pr., Nat. PflFam., 2. Aufl., **6**: 140. 1928, in part. — Type species (selected): *Gloeocystidium furfuraceum* (Bres.) Höhn. & L.

Gloeocystidiellum Donk *in* Meded. Nederl. mycol. Ver. **18–20**: 156. 1931, in part.

Misapplication.—*Gloeocystidium* P. Karst. (*in* Bidr. Känn. Finl. Nat. Folk **48**: 429. 1889) *sensu* Höhn. & L. *in* Wiesner-Festschr. 58. 1908, in part.

The characters emphasized for the present emendation of *Gloeocystidiellum* are: Fruit-body strictly resupinate; surface even to somewhat tuberculose (rarely with irregular, minute teeth); upper layer relatively well developed, sometimes layered, continuous, waxy (to nearly subgelatinous) to pellicular and soft, reposing on, and rather abruptly changing into, the often floccose-fibrillose, thin subicular layer which (in not too mature specimens) usually forms a well contrasting margin. Gloeocystidia present, generally completely immersed when well developed, elongating; rarely in addition

with rather thick-walled cystidia. Spores with amyloid walls, smooth, warted, to minutely spiny.

TYPE SPECIES (by original designation).—*Gloeocystidium porosum* (Berk. & G.) Wakef. sensu Wakef.

EXAMPLES.—

Gloeocystidiellum citrinum (Pers.) Donk, *comb. nov.* (basinym, *Thelephora citrina* Pers., Mycol. europ. **1**: 136. 1822), see note below; **Gloeocystidiellum convolvens** (P. Karst.) Donk, *comb. nov.* (basinym, *Corticium convolvens* P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **37**: 148. 1882); **Gloeocystidiellum furfuraceum** (Bres.) Donk, *comb. nov.* (basinym, *Hypochnus furfuraceus* Bres.,Fungi trident. **2**: 97. 1900); **Gloeocystidiellum heterogeneum** (Bourd. & G.) Donk, *comb. nov.* (basynim, *Peniophora heterogenea* Bourd. & G. *in* Bull. Soc. mycol. France **28**: 393. [1913]); **Gloeocystidiellum insidiosum** (Bourd. & G.) Donk, *comb. nov.* (basinym, *Gloeocystidium insidiosum* Bourd. & G. *in* Bull. Soc. mycol. France **28**: 370. [1913]); **Gloeocystidiellum karstenii** (Bourd. & G.) Donk, *comb. nov.* (basinym, *Gloeocystidium karstenii* Bourd. & G., Hym. France 254. [1928]); *G. lactescens* (Berk.) Boidin *in* C.R. Acad. Sci., Paris **233**: 1668. 1951; *Gloeocystidium letendrei* (P. Karst.) Bourd. & G.; *Gloeocystidiellum leucoxanthum* (Bres.) Boidin *in* C.R. Acad. Sci., Paris **233**: 825. 1951; **Gloeocystidiellum lividocoeruleum** (P. Karst.) Donk, *comb. nov.* (basinym, *Corticium lividocoeruleum* P. Karst. *in* Not. Sällsk. F. F. fenn. Förh. **9**: 370. 1868); *G. luridum* (Bres.) Boidin *in* C.R. Acad. Sci., Paris **233**: 1668. 1951; **Gloeocystidiellum ochraceum** (Fr. ex Fr.) Donk, *comb. nov.* [basinym, *Thelephora ochracea* (Fr.) ex Fr., Syst. mycol. **1**: 446. 1821]; *G. porosum* (Berk. & C.) Donk *in* Meded. Nederl. mycol. Ver. **18–20**: 156. 1931; *Corticium propinquum* H. S. Jacks. & Deard. *in* Canad. J. Res. C **27**: 155. 1949; **Gloeocystidiellum torrendii** (Bres.) Donk, *comb. nov.* (basinym, *Corticium torrendii* Bres. *in* Atti Accad. Agiati III **3**: 131. 1902, n.v.).

The genus "*Gloeocystidium* Karst." as conceived by Von Höhnel & Litschauer (*1908*: 58) and Bourdot & Galzin (*1913*: 354; *1928*: 247) differed from *Corticium* Fr. by the presence of gloeocystidia (generally not emerging) and from *Peniophora* Cooke [1] by the lack of 'cystidia.'

The term 'cystidia' as currently applied is a very inclusive one and should properly also include gloeocystidia, but this point of view is not taken for the occasion. Some types of cystidia (i) pass through a typical gloeocystidial stage and may rapidly become thick-walled and/or heavily encrusted, or (ii) without becoming thick-walled, may become empty, but retain their original shape, are more or less distinctly protruding, and often capped by excreted matter. It was this second type that was not excluded *a priori* by Bourdot & Galzin if it graded into deeply immersed gloeocystidia (cf. the group of *Corticium tenue* Pat.!), but cystidia of the first type were taken as incompatible with the delimitation of the genus.

In addition, species with far-protruding cystidia that remain thin-walled (without becoming empty at an early stage) and do not become immersed, and that could easily have been called gloeocystidia were not admitted either: cf. *Peniophora* sect. *Gloeocystidiales* Bourdot & Galzin (*1928*: 279). *Gloeocystidium pallidum* (Bres.) Höhn. & L., included in '*Gloeocystidium*,' clearly shows that such an arrangement is untenable, for it is too closely related to *Peniophora argillacea* (Bres.) Bres.; it possesses the same strongly projecting cystidia in addition to the gloeocystidia usually emphasized. Some typically gloeocystidiate

[1] In this paper the names *Peniophora* and *Corticium* Fr. will sometimes be used, incorrectly, in Bourdot & Galzin's sense. *Corticium* S. F. Gray (non Fr.) denotes *Peniophora* sect. *Coloratae* Bourd. & G. raised to the rank of a genus; it has *Peniophora* as a later synonym.

species, like *Peniophora polygonia* (Pers. ex Fr.) Bourd. & G., were transferred to *Peniophora* because they were inseparable from *Peniophora* sect. *Coloratae* Bourd. & G. (= *Corticium* S. F. Gray), a group that comprises a majority of species with thick-walled cystidia (often in addition to gloeocystidia). The very close relationship, verging on specific inseparability, between *Gloeocystidium roseocremeum* (Bres.) Brinkm. and *Peniophora setigera* (Fr.) Höhn. & L. was discussed by Bourdet & Galzin (*1928:* 258, 309), but all the same the first species was kept in *Gloeocystidium* and the second in *Peniophora*.

The line of demarcation between '*Gloeocystidium*' and *Corticium* Fr. (non S. F. Gray) was much easier to draw, presence and absence of gloeocystidia (barring a very few exceptions) being clear-cut characters. This does not mean that closely related species were not separated from each other. For example, the groups of *Gloeocystidium albostramineum* (Bres.) Höhn. & L. (= *Corticium punctulatum* Cooke), with gloeocystidia, and *Corticium bombycinum* (Sommerf.) Bres., without gloeocystidia, are presumably not generically distinct. These examples may suffice to demonstrate that '*Gloeocystidium,*' like *Corticium* Fr. and *Peniophora,* is not a natural taxon.

During the last years '*Gloeocystidium*' has been abandoned by several specialists and—remarkably enough—most of its species included in *Corticium* Fr. rather than in *Peniophora!* Only the species with cystidia of type (ii) are being transferred to *Peniophora,* because they may protrude considerably. (Species with wholly immersed thick-walled cystidia are also being referred to *Peniophora!*) This does not contribute to an easy distinction between *Corticium* Fr. and *Peniophora* and ignores Bourdot & Galzin's sage conclusion (*1928:* 247): "Le genre *Gloeocystidium* est donc relié très étroitement à *Peniophora,* tandis qu'il est assez nettement limité du côté de *Corticium* [Fr.]: à peine trouve-t-on un ou deux cas embarrassants." For these authors who abandon '*Gloeocystidium,*' it will often be more difficult to decide whether a species of '*Gloeocystidium*' has to be transferred to *Peniophora* or *Corticium* Fr., than to decide that there are only gloeocystidia present. Few mycologists will be able fully to understand the current guiding principles for the distribution of the contents of '*Gloeocystidium*' over *Corticium* Fr. and *Peniophora.*

Gloeocystidium P. Karst. was introduced with two species, which were never admitted by Von Höhnel & Litschauer, Bourdot & Galzin, or other authors. As applied by them, '*Gloeocystidium*' had been evidently an inadmissable use and hence a correct name was introduced to replace it, viz. *Gloeocystidiellum* Donk (*1931:* 156). The author did not deviate from Bourdot & Galzin's circumscription, but he stated that it was a very artificial genus. He added that he considered the sections *Amyloidea* and *Ceracea* of Bourdot & Galzin the nucleus to which other groups were added for the sake of convenience as long as these could not be satisfactorily classified.

Gloeocystidiellum, as emended in this paper, covers a fair part of '*Gloeocystidium*' of Bourdot & Galzin (*1928:* 247) and draws its species from three of their sections. First, the whole of *Gloeocystidium* sect. *Amyloidea* Bourd. & G. is included. Secondly, of *Gloeocystidium* sect. *Ceracea* Bourd. & G. some of the species of their second group, "Spores subglobuleuses ou largement elliptiques," like *Gloeocystidium lactescens* (Berk.) Höhn. & L. and *G. alutaceum* ("Schrad." ex Bres.) Bourd. & G. [= *Gloeocystidium citrinum* (Pers.) Lundell]

are referred to *Gloeocystidiellum*, while *Gloeocystidium tenue* (Pat.) Höhn. & L., *G. analogum* Bourd. & G., *G. mixtum* Bourd. & G. and *G. caesiocinereum* (Höhn. & L.) Bourd. & G. are excluded. The last of these species belongs to the Tremellales. Thirdly, *Gloeocystidium* sect. *Insidiosa* Bourd. & G. is also included.

Bourdot & Galzin correctly ascribed amyloid spores to the first of these sections ("*Amyloidea*") but failed to note this feature for some of the species of their section *Ceracea*, as indicated above. The explanation seems to be that they used "la solution iodo-iodurée de potassium" as they stated in the description of section *Amyloidea*, rather than Melzer's solution, which gives better results. Already Jackson (*1948*: 152) has noted the amyloid character of the spores in certain species considered by Bourdot & Galzin as having non-amyloid spores (for instance *Corticium radiosum*), and recently Boidin (*1950a*: 461; *1950b*: 134) has re-examined their species more in particular in this respect and has listed additional examples. *Gloeocystidiellum* as now emended covers all amyloid-spored species of Bourdot & Galzin's delimitation of *Gloeocystidium*, except those that are referable to *Gloeocystidium* sect. *Trichostroma* Bourd. & G. which form part of the genus *Scytinostroma* Donk (see p. 19).

Jackson (*1948*: 143–144) already envisaged the present emendation in a tentative manner: "*Gloeocystidiellum* Donk ... is an available generic name for the gloeocystidiate forms. This generic name, because of its type, should perhaps be used, if at all, only in a restricted sense to include certain of the species having amyloid spore walls." Recently Boidin has added important additional reasons for the maintenance of *Gloeocystidiellum*, if restricted to the species with amyloid spores, as will be presently discussed. Eriksson (*1954*: 191) accepted the genus in this restricted sense.

It may well be asked whether the amyloid spore-wall in *Gloeocystidiellum* is not too heavily underlined as a generic feature. The following digression may contribute to an increased confidence in its importance in the present case.

In *Corticium* Fr. sensu Bourd. & G. only a few species possess amyloid spore-walls. These are all easily distinguishable from *Gloeocystidiellum* because they lack gloeocystidia and they are also in other respects sufficiently different not to be confused with the latter genus.

[W. B. Cooke (*1956*: 387) states that "the spores of all specimens of the genus *Phlebia*," as he understands it, "gave the amyloid reaction when mounted in Melzer's reagent." I am unable to confirm this statement as to the European species mentioned by Cooke. A series of species placed in *Corticium* by Bourdot & Galzin and which I believe to be better classed in *Phlebia*, also failed to yield amyloid spores.]

Of *Peniophora* Cooke sensu Bourd. & G. there are now two species known with amyloid spores; these, too, appear out of place in the genus to which they have been assigned. They are *Peniophora heterogenea* Bourd. & G. and *P. laevigata* (Fr.) Mass. The first ought to be referred to *Gloeocystidiellum* in Eriksson's opinion (*1954*: 192), with which I agree. The second belongs in the direct neighbourhood of *Stereum areolatum* (Fr.) Fr. and *S. chailletii* (Pers.) Fr. rather than in *Peniophora*; it should also be excluded from that genus, as has already been the opinion, too, of Boidin (*1950b*: 135) and Eriksson (*1950*: 6), but is not at all related to *Gloeocystidiellum*.

Thus, it would appear that, first, all the amyloid-spored species attributed to

Corticium Fr. and *Peniophora* except one are apparently not congeneric with *Gloeocystidiellum*, and, secondly, should be excluded from both *Corticium* Fr. and *Peniophora*.

On the other hand, it may be asked whether there are gloeocystidiate species with non-amyloid spores that would better be classed as species of *Gloeocystidiellum*. As far as my knowledge goes this is not the case. [I do not know such species as *Gloeocystidium analogum* and *G. mixtum*.]

I believe that in many groups of hymenomycetes the amyloid character of the spore-wall is often too much stressed. I would certainly not admit a genus on the basis of this character only. *Mucronella* Fr., *Scytinostroma*, and other genera are with our present knowledge homogeneous indeed, although the spore-wall may or may not be amyloid. *Gloeocystidiellum* appeals as a natural group and would remain so in my eyes if some really related species with non-amyloid spore-walls were to be included. Until such species become known, the amyloid walls of the spores should be accepted as a well marked and highly convenient key-character that facilitates separation of *Gloeocystidiellum* from other genera.

In many respects there is a close resemblance with *Corticium* S. F. Gray, especially with such species like *Corticium polygonium* (Pers. ex Fr.) Fr. that do not possess thick-walled cystidia in addition to gloeocystidia. As far as I know no species of *Gloeocystidiellum* have a reddish coloured spore-print as is the case in *Corticium* S. F. Gray. Recently Boidin (*1951a*, *b*) found that the two genera agreed in two important points. First, gloeocystidia of both genera gave a positive reaction with sulpho-aldehydic tests, while such species of '*Gloeocystidium*' that do not belong to *Gloeocystidiellum*, like *Gloeocystidium albostramineum*, *G. tenue*, *G. roseocremeum*, and a form related to *G. pallidum*, as well as *Stereum bicolor*, gave a negative reaction. Secondly, Boidin also found that some species of *Gloeocystidiellum* proved to be hemi-chiastic, like all species of *Corticium* S. F. Gray investigated in this regard. Other species of *Gloeocystidiellum* are chiastic, but the two types are bridged by *Gloeocystidium alutaceum* ("Schrad". ex Bres.) Bourd. & G. [= *Gloeocystidiellum citrinum*].

Eriksson (*1954*: 193) is convinced that *Gloeocystidiellum* shows marked relations to *Aleurodiscus* Rabenh. ex J. Schroet. "Not only the nature of the spores, but also the shape of the basidia (which places e.g. *Corticium luridum* and *Aleurodiscus lapponicus* close to each other), and the presence of *Aleurodiscus*-like acanthophyses in *Corticium lividocoeruleum*, support this relationship."

There is also a chemical and microscopical resemblance between *Gloeocystidiellum* and *Hericium* Pers. ex S. F. Gray (*Dryodon* Quél. ex P. Karst.), the latter genus with toothed fruit-bodies. Both groups have the amyloid spores and the gloeocystidia in common. The likeness suggested a natural relationship to Bourdot & Galzin (*1928*: 444), who wrote in an observation on *Dryodon:* "Les *Gloeocystidium contiguum* et *porosum* ont des formes odontioides à aiguillons courts, 0,5 mm. qui ont les mêmes élements hyméniens que les *Dryodon*." Donk (*1931:* 160) acted in accordance with this remark and treated *Hericium* as a closely related genus, which he placed in the immediate neighbourhood of *Gloeocystidiellum*. When *Hericium* will be properly revised, and perhaps divided into several genera, opinions might diverge whether *Gloeocystidiellum* should go with *Hericium* into a taxon of higher rank, or be left in Corticiaceae as the genus

which would fix the place of the hericiums in classification. In many respects the resupinate "*Hydnum*" *fragile* Pers. ex Fr. seems to be an intermediate form.

I take it that the name *Thelephora radiosa* Fr. ex Pers. was not validly published by Fries in his "Elenchus" (**1**: 206. 1828). In the latter work the name is given accompanied by a description and synonymy in small print, listed apparently for the sake of completeness, but not definitely accepted taxonomically as a valid species: "... sed versiformis, nunc *T. lacteae*, nunc *T. laevis* filia videtur, hinc omisi." And compare Fries (*1838:* 560): "exclusi in S.M. quia dubia stirps." This leaves us with two simultaneously published names for the species in question: *Thelephora citrina* Pers. and *Thelephora radiosa* Fr. ex Pers. (and perhaps also, if Fries were correct, *Athelia ochracea* Pers.). Of these two names Lundell (*1939:* 18) preferred the former when publishing the combination *Gloeocystidium citrinum* (Pers.) Lundell; he cited "*Thelephora radiosa* Fr. ex Fr. Elench. fung. I p. 206" in synonymy, although he did not cite *Thelephora radiosa* Fr. ex Pers. 1822. In case *Thelephora radiosa* as published by Fries in his "Elenchus" is not to be regarded as a nomen provisiorium, the correct name of the species should be derived from that name, it being published in a volume of the starting-point book.

Considerable confusion has arisen from Karsten's erroneous application of the name *Corticium ochraceum* (Fr. ex Fr.) Fr. to a different fungus from Fries's. The new combination *Gloeocystidiellum ochraceum* is here applied to the original fungus, that is, the species that has been called *Gloeocystidium friesii* Lundell.

Tubulicrinis Donk, *gen. nov.*

Peniophora sect. *Tubuliferae* Bourd. & G. *in* Bull. Soc. mycol. France **28**: 381 [1913] (as "Groupe"); Hym. France 283. [1928]; in part. — Type species (selected): *Peniophora glebulosa* (Bres.) Sacc. & P. Syd.

Receptaculum resupinatum, effusum, candidum vel pallidum, hymenio leve vel raro interrupto, sub lente hispidulo. Cystidia cylindrica vel subconica, plerumque 2 vel pluribus radicibus praedita, parietibus valde incrassatis (luminibus capillaribus) sed apicibus tenuiter tunicatis, levia saltem quoad partis crassitunicatae, plus minusve dissolvantia in solutione KOH. Basidia aseptata, sterigmata 2–4 gerentia. Sporae tenuiter tunicatae, leves, incolores.

Fruit-bodies wholly resupinate, usually closely adnate, often (very) thin and pruinose to closed, often somewhat waxy patches with indeterminate margin, rarely thin cottony-membranous or starting as somewhat fleshy patches and separable in fragments, often white or whitish, the surface (under the handlens) hispid to atomate. Trama with basal layer consisting of narrow, thin-walled hyphae which usually soon become agglutinated and indistinct, pervaded by firmer and more distinct hyphae from which the cystidia arise; and a layer of ascending, collapsing, often indistinct hyphae giving rise to the hymenium; in a few species tramal hyphae distinct, the basal ones more or less thick-walled. Cystidia (lyocystidia) arising from the distinct basal hyphae (many with 2—more roots), often far-protruding, slender, cylindrical to slightly conical, very thick-walled (lumen capillary) but becoming more or less abruptly thin-walled towards the pointed to capitately swollen, thin-walled apex, breakable, with smooth surface, not encrusted except often at thin-walled (apical) portion with loosely attached crystals or sheathing caps, colourless; wall not stainable by eosin, often more or less amyloid, dissolving in 10% potassium hydroxide. Basidia clavate, undivided; sterigmata 2–4. Spores globular to curved-cylindric, even in outline, small to medium-sized, colourless; walls smooth, non-amyloid; not exhibiting repetition.

Epixylous, usually on very rotten wood.

TYPE SPECIES.—*Peniophora glebulosa* (Bres.) Sacc. & P. Syd. Type specimen: France, Aveyron, leg. A. Galzin 2261 (in herb. Donk 2419).

EXAMPLES.—

Peniophora abnormis Bourd. & G., Hym. France 290. [1928]?; **Tubulicrinis accedens** (Bourd. & G.) Donk, *comb. nov.* (basinym, *Peniophora glebulosa* subsp. *P. accedens* Bourd. & G. *in* Bull. Soc. mycol. France **28**: 386. [1913]); **Tubulicrinis angusta** (D. P. Rog. & Weres. apud Weresub) Donk, *comb. nov.* (basinym, *Peniophora angusta* D. P. Rog. & Weres. *apud* Weresub *in* Canad. J. Bot. **31**: 764. 1953); **Tubulicrinis calothrix** (Pat.) Donk, *comb. nov.* (basinym, *Corticium calothrix* Pat., Cat. rais. Pl. cell. Tunis. 59. 1897); **Tubulicrinis chaetophora** (Höhn.) Donk, *comb. nov.* (basinym, *Hypochnus chaetophorus* Höhn. *in* S.B. Akad. Wien, M.-n. Kl. I **111**: 1007. 1902); *Peniophora effugiens* (Bourd. & G.) Bourd. & G.; *Peniophora farinacea* Bourd. & G.; **Tubulicrinis glebulosa** (Bres.) Donk, *comb. nov.* (basinym, *Corticium glebulosa* Bres., Fung. trident. **2**: 61. 1898), see note below; **Tubulicrinis hamata** (H. S. Jacks.) Donk, *comb. nov.* (basinym, *Peniophora hamata* H. S. Jacks. *in* Canad. J. Res. C **26**: 133. 1948); *Peniophora hirtella* (Bourd. & G.) Bourd. & G.; **Tubulicrinis inornata** (H. S. Jacks.) Donk, *comb. nov.* (basinym, *Peniophora inornata* H. S. Jacks. *in* Canad. J. Res. C **26**: 139. 1948); **Tubulicrinis juniperina** (Bourd. & G.) Donk, *comb. nov.* (basinym, *Peniophora glebulosa* subsp. *P. juniperina* Bourd. & G. *in* Bull. Soc. mycol. France **28**: 386. [1913]); **Tubulicrinis karstenii** (Bres.) Donk, *comb. nov.* (basinym, *Stereum karstenii* Bres. *in* Atti Accad. Agiati III **3**: 108. 1897, cf. Rogers & Jackson *in* Farlowia **1**: 320, 327. 1943, as *Peniophora crassa* Burt & Peck); **Tubulicrinis prominens** (H. S. Jacks. & Deard.) Donk, *comb. nov.* (basinym, *Peniophora prominens* H. S. Jacks. & Deard. *in* Mycologia **43**: 57. 1951); **Tubulicrinis propinqua** (Bourd. & G.) Donk, *comb. nov.* (basinym, *Peniophora cretacea* subsp. *P. propinqua* Bourd. & G., Hym. France 288. [1928]); **Tubulicrinis regifica** (H. S. Jacks. & Deard.) Donk, *comb. nov.* (basinym, *Peniophora regifica* H. S. Jacks. & Deard. *in* Mycologia **43**: 57. 1951); **Tubulicrinis sceptrifera** (H. S. Jacks. & Weres. apud Weresub) Donk, *comb. nov.* (basinym, *Peniophora sceptrifera* H. S. Jacks & Weres. *apud* Weresub *in* Canad. J. Bot. **31**: 772. 1953); **Tubulicrinis subulata** (Bourd. & G.) Donk, *comb. nov.* (basinym, *Peniophora glebulosa* subsp. *P. subulata* Bourd. & G. *in* Bull. Soc. mycol. France **28**: 285. [1913]); *Peniophora vermifera* Bourd. *in* Rev. sci. Bourbonn. **23**: 13. 1910.

This genus is well characterized by its quite distinctive cystidia, as given in the generic description. For these structures the term lyocystidia is proposed.

In Bourdot & Galzin's treatment of *Peniophora* Cooke the present genus formed the kernel of the much larger group *Peniophora* sect. *Tubuliferae* Bourd. & G., which they divided as follows (*1928:* 283–296):

* *Peniophora livida* (Fr.) ex Burt, etc. (Group 1).
** *Peniophora vermifera* Bourd., *P. aegerita* sensu Höhn. & L., etc. (Group 2).
*** The present genus (Group 3).
**** *Peniophora subalutacea* (P. Karst.) Höhn. & L., *P. luna* Romell ex D. P. Rog. & Jacks. (*P. odorata* sensu P. Karst.), etc. (Group 4).

Of these, Group 1 seems referable to *Phlebia* Fr. in an emended, much enlarged, circumscription (cf. Donk, *1931:* 148); it differs strongly in many respects, for instance in the frankly soft-waxy to gelatinous fruit-bodies, and the cystidia which originate with the basidia and become included in the trama (old portions of thickened hymenium) afterwards and are not typically two- or more-rooted.

Group 4 is also excluded and seems for the time being best referred to *Odontia* Fr. emend. Bourd. & G., where it closely approaches such species like *Odontia barba-jovis* Fr. The cystidia (often quite thick-walled with thin-walled apex) do not dissolve in KOH solution and are apparently of different chemical composition as they are tough and pliable (rather than stiff and breakable) and

their walls strongly absorb eosine. Moreover, the structure of the fruit-body is on a whole very different, too.

It would seem that Group 2 is closely related with *Tubulicrinis* as delimited above. Its species possess very thick-walled cystidia, which, however, differ in that their walls do not remain thin in the apical portion (which is always pointed), are roughened at the outside, and do not dissolve in KOH solution. In *Tubulicrinis* the thin-walled apex may be capitately swollen and more or less covered with excreted matter or even with a characteristic (not dissolving) cap. Perhaps, *Peniophora vermifera* Bourd. is a link between the two taxa in so far as the apex of the cystidia is not as characteristically thin-walled as is usual in *Tubulicrinis*. Bourdot & Galzin placed it in group 2, but Weresub (*1953:* 773) finds that in this species, the roughened appearance proves to be due to dendroid hyphae in which the cystidia are sheathed. Another species in which the apex of the cystidia is often not typically and characteristically thin-walled is *Tubulicrinis chaetophora*. At present it is a matter of taste to draw a generic line of demarcation between *Tubulicrinis* and Group 2 and, perhaps, still other groups, and it seems not unlikely that future researches will indicate that the present genus must be extended. If such a course were thought to be necessary I would not be surprised if *Tubulicrinis* were to include at least the following groups.

(i) Cystidia very thick-walled (lumen capillary, may become obliterate); apex not permanently thin-walled; walls at outside rough. Examples: *Peniophora clematitis* Bourd. & G., *P. aegerita* sensu Höhn. & L. As to *P. abietis* Bourd. & G. see Eriksson (*1954:* 193).

(ii) Cystidia slightly thick-walled: walls thicker than walls of basidiferous hyphae, uniformly thickened. Examples: *Peniophora lauta* H. S. Jacks., *P. populnea* Bourd. & G. [not (Peck) Burt].

One might, perhaps, even go still further and add the *Peniophora rimicola* (P. Karst.) Höhn. & L. group, as recently treated by Jackson (*1950b*), but by its context and several other features it seems to differ too strongly from the preceding series to be possibly congeneric.

A few remarks about the correct name of the fungus previously called *Peniophora glebulosa* Bres. seem desirable. When describing *Thelephora calcea* Fr. (non Pers.) Fries (*1828:* 215) expressed its range of variability by distinguishing between two conditions each with two aspects he was acquainted with from personal observation. Under the typical condition the aspects are a. lactea and b. argillacea; and under condition "**glebulosa*, exsiccata in glebulas minimas partita," he also distinguished between two aspects, which he again described as a. lactea and b. argillacea. About the status and value of these "forms" he remarked: "... siccitate more plurimarum inciso-rimosa; vero, quae status praecipitatus apparet, tota in glebulas minimas solvitur. Individua lactea at argillacea utriusque mixta legimus ..."

On this basis it has been generally assumed that Fries published a name "*Thelephora calcea* var. *glebulosa*." This hardly seems to be the case. First, if really intended as an epithet, the rank of "**glebulosa*" is not evident at all. The asterisk certainly does neither denote a variety (as Bresadola would have it) nor a subspecies: both ranks Fries indicated in quite different manners in his "Systema." Secondly, attention must be drawn that Fries spoke of "**glebulosa*"

as a "status praecipitatus," which points to a condition rather than to a taxonomic unit. Thirdly, it may even be doubted whether the word 'glebulosa' was printed in italics to mark an epithet of whatever rank: in my opinion it was so printed merely to stress a character. The works 'lactea' and 'argillacea', too, were given as purely descriptive ones: they were emphatically not intended as epithets, being given to "individua" and not being printed in italics! In later work Fries (*1838:* 562) referred back to "*C. calceum* ... Fr. El. p. 215. c. syn. et varr.," but did not mention the "varr." by name.

In view of these considerations it seems correct to deny the existence of the name "*Corticium calceum* var. *glebulosa* Fr., Elench. **1**: 215. 1828" as a validly published one. Even if one would be disposed to reject this conclusion, the fact remains that *Corticium glebulosum* Bres. was given to a taxon of different rank and hence should not necessarily be considered a straight isonym, although Bresadola cited "*Thelephora calcea* Fr. var. *glebulosa* Fr. Elenc. I p. 215!" in the synonymy of his species, which he, moreover, called *Corticium glebulosum* "(Fr.) Bres." The *specific* name *Corticium glebulosum* has to be interpreted in the first place in agreement with the accompanying description.

By the point of exclamation Bresadola indicated to have studied a specimen from Fries's herbarium, supposed to be typical or at least authentic for the alleged name '*Corticium calceum* var. *glebulosum* Fr.' This specimen (or at least a portion of it) consists of a species overgrown by another resupinate species. It is, for instance, the type of *Peniophora cretacea* Bourd. & G., which undoubtedly is based on both elements which were considered to form a single individual fruitbody: hence *Peniophora cretacea* must be rejected as a nomen confusum.

However, in the case of *Corticium glebulosum* it is evident from both Bresadola's description and illustration that no confusion of two different fungi occurred, even when the specimen or portion of a specimen that Bresadola studied consisted of the two species. As long as it is not conclusively demonstrated that (i) the 'basinym' Bresadola referred to is a validly published name, and (ii) that *Corticium glebulosum* ought not to be treated as a new name for a new taxon (or for a taxon in different rank), I prefer to regard the latter name as priorable ("available"). Therefore, I do not follow Rogers & Jackson (*1943:* 317), who rejected Bresadola's name and replaced it by a new one, viz. *Peniophora gracillima* Ell. & Ev. ex D. P. Rog. & Jacks.

Laeticorticium Donk, *gen. nov.*

Corticium Pers. *in* Neues Mag. Bot. **1**: 110. 1794 (= Tent. 30. 1797) (devalidated name). — *Thelephora* sect. *Corticium* (Pers.) Pers., Syn. Fung. 573. 1801 (devalidated name). — *Thelephora* [sect.] *Corticium* (Pers.) ex Pers., Mycol. europ. **1**: 128. 1822. — *Corticium* Pers. ex Burt *in* Ann. Missouri bot. Gdn **13**: 173. 1926; not *Corticium* S. F. Gray, Nat. Arr. Brit. Pl. **1**: 653. 1821 ("Persoon"); not *Corticium* Fr., Fl. scan. 340. 1835.[1] — Type species (selected [2]): *Corticium roseum* Pers.

? *Hyphelia* Fr., Syst. Orb. Veg. 149. 1825 (impriorable) *ex* Fr., Elench. **1**: 161. 1828 (in obs.); Syst. mycol. **3** (1): 211. 1829 (nomen anamorphosis). — Type species (by original designation): *Trichoderma roseum* "Pers." sensu Fr. = *Hyphelia rosea* Fr.

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[1] *Corticium* Fr. is a different (although homonymous) name from *Corticium* Pers.; this was emphatically stated by Fries (*1836:* 15). For *Corticium* S. F. Gray, see Donk (*1949:* 94) and Rogers (*1949:* 439).

[2] Suggested by Clements & Shear (*1931:* 344) and accepted by Donk (*1941:* 165–166). Afterwards Shear (*1943:* 270) preferred *Corticium laeve* Pers.

? *Hyphoderma* Fr., Summa Veg. Scand. **2**: 447. 1849 (nomen anamorphosis), not *Hyphoderma* Wallr., Fl. crypt. Germ. **2**: 576. 1833. — Type species (only original species): *Hyphelia rosea* ("Pers." sensu Fr.) Fr.

Lyomyces P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **37**: 153. 1882, not *Lyomyces* P. Karst. *in* Rev. mycol. **3** (No. 9): 23. 1881 ("*Lyomices*"). — *Aleurodiscus* subgen. *Lyomyces* (P. Karst.) Pilát *in* Ann. mycol., Berl. **24**: 219. 1926. — Type species (selected): *Corticium roseum* (Pers. ex Fr.) Fr.

Corticium sect. *Aleurodiscoides* Bourd. & G., Hym. France 227. [1928]. — Type species (selected): *Corticium roseum* (Pers. ex Fr.) Fr.

Minnsia Ell. & Ev. in herb. *ex* Spaulding & Hansbrough *in* Techn. Bull. U.S. Dep. Agr. No. 876: 8, 10. 1944[1] (nomen nudum; nomen anamorphosis). — Type species (only species): *Minnsia carnea* Ell. & Ev. in herb. (imperfect stage) = *Aleurodiscus minnsiae* H. S. Jacks.

Receptaculum resupinatum, effusum, membranaceum, in vivo separabile in fragmentos interdum adnatum et laete coloratum (roseum vel lilacinum), hymenio leve. Hyphae fibulatae. Stratum superius bene evolutum, continuum, plus minusve crascescens, e hyphidiis pauce ramulosis, nodulosis, tenuiter tunicatis et e basidiis compositum. Gloeocystidia et cystidia desunt. Basidia aseptata, primo vesiculosa, deinde elongata et demum cylindrico-clavata, flexuosa, 45–100 μ longa, sterigmata 2–4 gerentia. Sporae ovoideae vel ellipsoideae, unilateraliter subapplanatae, 7–16 μ longae, leves, parietibus tenuibus, non-amyloideis, quando cumulatae albae vel roseae.

Fruit-body resupinate, effused, indeterminate, rather thin, membranous, separable in fragments when fresh or adherent, pale but vividly coloured (pinkish, lilacinous) when fresh, fading upon drying. Subicular layer usually fibrillose-subfloccose and extending beyond the upper layer as a contrasting margin, thinning-out; hyphae interwoven, or partially parallel to substratum (basal ones), distinct, about 3–4.5 μ in diameter, not tough, thin- to thick-walled (lumen may be capillary), clamped. Upper (basidial) layer well developed, continuous and compact, somewhat fleshy to waxy when fresh, often contracted and rimose when dry, thickening, composed of upright, more or less sparingly branched (often with short side-branches), thin-walled, nodulose hyphae (hyphidia) and basidia originating deeply and traversing the layer of hyphidia. Gloeocystidia and cystidia lacking. Basidia at first swollen, ovoid to pear-shaped, elongating, cylindrical-clavate when fully developed, flexuous (and often somewhat ventricosely swollen at base), rather large (45–100 μ long); sterigmata 2–4, conical, curved. Spores ovoid, ellipsoid, somewhat flattened adaxially, with prominent apiculus, medium-sized (7–16 μ long); wall smooth, thin, non-amyloid; colourless under the microscope, white or pink in mass.

On wood, bark, branches. Temperate northern regions.

Type species.—*Corticium roseum* Pers.

Examples.—

Laeticorticium roseum (Pers. ex Fr.) Donk *comb. nov.* [basinym, *Thelephora rosea* (Pers.) ex Fr., Syst. mycol. **1**: 451. 1821], **Laeticorticium polygonioides** (P. Karst.) Donk, *comb. nov.* (basinym, *Corticium polygonioides* P. Karst. *in* Medd. Soc. F. F. fenn. **6**: 12. 1881); **Laeticorticium jonides** (Bres.) Donk, *comb. nov.* (basinym, *Corticium jonides* Bres. *apud* Brinkm. *in* Jber. westfäl. ProvVer. W. u. K. **26**: 128. 1898), **Laeticorticium minnsiae** (H. S. Jacks.) Donk, *comb. nov.* (basinym, *Aleurodiscus minnsiae* H. S. Jacks. *in* Canad. J. Res. C **28**: 67. 1950), **Laeticorticium pini** (H. S. Jacks.) Donk, *comb. nov.* (basinym, *Aleurodiscus pini* H. S. Jacks. *in* Canad. J. Res. C **28**: 74. 1950).

This genus is easily to deliminate and to recognize. Several years ago Donk (*1941:* 166) indicated that he considered *C. roseum* "the type of a separate genus to be held apart from the large bulk of present day true corticiums." Jackson

[1] Jackson (*1950a:* 67) reproduces the sentence in which this name appears.

(*1950a:* 64) was of about the same opinion: "This group, we venture to predict, will ultimately contain several recognizable species and when better understood it may be found logical to include them in a genus separate from *Aleurodiscus*." More recently Eriksson (*1954:* 193) also voiced the opinion that the taxon, perhaps, should be regarded as a separate genus.

Distinguishing features are the colour of the fruit-bodies; the typical kind of hyphidia and the very typical hyphidial hymenium with the basidia originating very deeply as swollen vesicles at first, very much elongating afterwards; the clamped hyphae not discolouring in Melzer's solution in the manner as indicated under *Scytinostroma* Donk (p. 19); the horn-shaped sterigmata; and the more or less dorsally flattened, non-amyloid, smooth, and thin-walled spores of medium-size and without an 'inner wall' of dense, plasmatic contents as is present in the typical species of *Aleurodiscus* Rabenh. ex J. Schroet. A remarkable fact is that the spores may be either pink or white in a print, depending on the species (oral communication by Dr J. Eriksson, Uppsala).

A very curious imperfect state is known for *L. minnsiae:*

"[This] species ... is of special interest because of a unique sclerotial disseminating phase which precedes the basidial fructification and occurs on the upper side of the twigs of the host [in North America] in mid-summer or early fall... This phase when mature consists of a brightly colored, open, cup-shaped structure about 1 mm. in diameter which has in the center, loosely attached at the base, a flattened sphaeroid body about ½ mm. in diameter which finally becomes free and apparently functions as a sclerotial propagating body. The structure might be described as like a tiny 'nest' with a single 'egg.' It shows a superficial resemblance to *Sphaerobolus* but is sessile on the substratum and has a more open, less lacerated peridium, with no suggestion of a medial gelatinous layer."—Jackson (*1950a:* 64).

It looks as if still another genus of imperfect fungi is connected with *Laeticorticium* as far as the type species is concerned. Both the generic names *Hyphelia* Fr. ["*Trichoderma roseum* P. (non *Trichothecium* Link) pro generis typo propono ..."] and *Hyphoderma* are based on an imperfect state (*Hyphelia rosea* Fr.) of which Fries (*1828:* 126) concluded in a rather lengthy digression that it was connected with *Thelephora rosea* Pers. ex Fr. From some additional information at hand I would not be surprised if this would prove to be correct. Certainly not correct is Von Höhnel's conclusion (*1910*), who studied a specimen from Fries's herbarium ("leg. E. Fries, Smoland, Femsjö") and thought that it represented a species related to *Corticium centrifugum* (Lév.) Bres. (sensu auctt. = *Athelia epiphylla* Pers.): "Basidien und Sporen wurden nicht gesehen. Es ist wahrscheinlich, dass es sich nur um eine Jugendform von *Corticium centrifugum* handelt." The fact that the hyphae of the specimen forms "zahlreiche rötlich gefärbte, 40 bis 60 μ breite Sclerotien," does not at all point to the species Von Höhnel had in mind.

Soon afterwards Fries (*1835:* 355) doubted the homogenity of *Hyphelia* and he proceeded (Fries, *1849:* 447) to split the genus into "*Hyphelia.* Fr." (no reference) and *Hyphoderma* Fr.; the latter received *Hyphelia rosea.* This second genus *Hyphelia* was the one taken up by Juel (*1920*) for a genus of imperfect fungi characterized by radula-spores and quite different from *Hyphelia rosea.* The correct name for *Hyphelia* Fr. 1849 or perhaps, rather, *Hyphelia* Fr. sensu Fr. 1849 would seem to be *Ostracoderma* Fr.

Laeticorticium minnsiae and *L. pini* are both heterothallic. A form occurring

on *Populus* and determined as *L. roseus* proved to be homothallic (Jackson, *1950a*).

If the name *Corticium* Pers. had not been devalidated by the acceptance of Fries's "Systema" as the starting-point book for these fungi, it would have to be taken up for this small genus, because of its typification by *L. roseum*. At the acceptance of later starting-points this name became validly re-published as early as 1821 by S. F. Gray with a different species (*Thelephora quercina* Pers.) as its type.

Lyomyces P. Karst. (*l.c.*, 1882) was introduced with nine species of which *Corticium roseum* is the first; this species is here selected as its type. From Karsten's descriptions one would conclude that he was familiar only with the first species; afterwards in a work restricted to Finnish fungi, Karsten (*1889:* 418) included only two species, *Corticium roseum* and *C. polygonioides* P. Karst. This latter species is not an original one. *Lyomyces* P. Karst. of 1882 is imprior-able on account of the earlier homonym *Lyomyces* P. Karst. of 1881, introduced with three species, of which I select the first, "*L. serus* (Pers.)," as the type. In Karsten's sense at that time this species represents *Peniophora setigera* (Fr.) Höhn. & L. (cf. von Höhnel & Litschauer *1906:* 1559). My reasons for considering *Lyomyces* P. Karst. (*l.c.*, 1881) as a different (although homonymous) name, rather than an application of the same name are: (i) there are no indications that in 1882 Karsten took up the name of the previous year, and in 1889 (*l.c.*) he did not refer to the publication of 1881, but cited only the one of 1882; (ii) none of the species of 1881 was included in 1882. (iii) As soon as he abandoned a name, he considered it quite in order to publish a homonym for a different genus; compare for instance, *Hydnellum* P. Karst. (1879; type species, *Hydnum suaveolens* Scop. ex Fr.) and *Hydnellum* P. Karst. (1896; type species, *Kneiffia subtilis* P. Karst.)! Fries often did exactly the same.

Scytinostroma Donk, *gen. nov.*

Corticium sect. *Trichostroma* Bourd. & G., Hym. France 225. [1928]. — Type species (selected): *Corticium portentosum* Berk. & C.

Gloeocystidium sect. *Trichostroma* Bourd. & G., Hym. France 263. [1928]. — Type species (only original species): *Gloeocystidium ochroleucum* Bres. & Torrend apud Torrend.

Receptaculum resupinatum, effusum; hymenio leve vel tuberculoso. Stratum basale coriaceum e hyphis compactis, tenacibus, tenuibus, parietibus crassis, rufescentibus in solutione Melzer dicta. Stratum superius e hyphidiis ascendentibus, multo ramosis, tenuiter tunicatis, e basidiis et interdum e gloeocystidiis compositum. Cystidia desunt. Basidia aseptata, cylindraceo-clavata, plus minusve flexuosa, sterigmata 2–4 gerentia. Sporae leves vel minute asperulatae, parietibus amyloideis vel non amyloideis.

Fruit-body resupinate, effused, usually becoming rather thick, layered or not layered, white to pallid; surface smooth to somewhat tuberculose; margin often more or less determinate. Subicular layer coriaceous, corky-fibrillose, for the most part composed of closely compacted, interwoven, sparsely septate hyphae which are tough, narrow (hardly depassing 3 μ in diameter), with thick, refractive walls turning reddish brown in Melzer's solution and capillary or even obliterating lumen. Upper (basidial) layer, when well developed and sporulating, waxy, indurating and cracking upon drying, often becoming layered, composed of upright, much-branched, thin-walled hyphae between which the basidia and, in certain species, gloeocystidia arise. Gloeocystidia present or lacking, remaining thin-walled, immersed; cystidia lacking. Basidia

cylindrical-clavate, more or less flexuous, developing from a much shorter, swollen stage; sterigmata 2–4, rather thin and straight. Spores even in outline; wall smooth or minutely asperulate, strongly amyloid or not.

On wood, saprobic or parasitic. Apparently cosmopolitan.

TYPE SPECIES.—*Corticium portentosum* Berk. & C.

EXAMPLES.—

Scytinostroma duriusculum (Berk. & Br.) Donk, *comb. nov.* [basinym, *Stereum duriusculum* Berk. & Br. *in* J. Linn. Soc., Lond. (Bot.) **14**: 66. 1873]; **Scytinostroma galactinum** (Fr.) Donk, *comb. nov.* (basinym, *Thelephora galactina* Fr. *in* Nova Acta Soc. Sci. upsal. III **1**: 136. 1851); **Scytinostroma ochroleucum** (Bres. & Torrend) Donk, *comb. nov.* (basinym, *Gloeocystidium ochroleucum* Bres. & Torrend *apud* Torrend *in* Brotéria, Sér. bot. **11**: 81. 1913); **Scytinostroma odoratum** (Fr. ex Fr.) Donk, *comb. nov.* (basinym, *Thelephora odorata* Fr. *ex* Fr., Syst. mycol. **1**: 445. 1821); **Scytinostroma portentosum** (Berk. & C.) Donk, *comb. nov.* (basinym, *Corticium portentosum* Berk. & C. *apud* Berk. *in* Grevillea **2**: 3. 1873); **Scytinostroma praestans** (H. S. Jacks.) Donk, *comb. nov.* (basinym, *Corticium praestans* H. S. Jacks. *in* Canad. J. Res. C **26**: 148. 1948); **Scytinostroma quaesitum** (H. S. Jacks. & Deard.) Donk, *comb. nov.* (basinym, *Corticium quaesitum* H. S. Jacks. & Deard. *in* Canad. J. Res. C **27**: 154. 1949); *Asterostromella rumpiana* Talbot apud Wakef. & Talbot.

This genus seems well characterized by the coriaceous subiculum and the subicular hyphae as characterized above in the generic description, the presence of a special type of hyphidia, and the pallid (not brightly coloured) fruitbody. The spore-wall may be either amyloid or not.

Scytinostroma takes its species from *Corticium* Fr. (not *Corticium* S. F. Gray) (without gloeocystidia) and from *Gloeocystidium* P. Karst. sensu Höhn. & L. (with gloeocystidia). *Corticium subodoratum* P. Karst., included in *Corticium* sect. *Trichostroma* by Bourdot & Galzin (*1928:* 226), is not admitted: it has broader and less thick-walled subicular hyphae which, moreover, do not turn reddish brown in Melzer's solution as has been already reported by Jackson (*1948:* 149).

Recently Jackson (*l.c.*) remarked that most of the species mentioned above "show characters that suggest a relationship with the genus *Vararia* and it seems quite probable that ultimately they will be found to form a natural section of that genus or perhaps be united in a separate related genus." Talbot (*1951:* 51–54 text-pls. 36–38) had reached a similar conclusion when he transferred several species of *Trichostroma* to *Asterostromella* Höhn. & L., a later synonym of *Vararia* P. Karst.,[1] with dichohyphidia. It is only after a long and careful comparison of several species (some of which are common in the Asiatic tropics) that I have decided to keep to the other course outlined by Jackson and to consider the two groups as distinct genera.

Talbot used the following standard mounting technique for comparative studies:

"Sections were mounted in a drop of concentrated hydrochloric acid (to clear minerals) which was then drained away and replaced by 10% KOH until bubbling ceased. Two such alkaline mounts were made, one with the addition of phloxine stain and the other without. For examining the branching of hyphae the sections were teased out with needles."—Talbot (*1951:* 51).

[1] It would seem that a few errors crept into Talbot's synopsis on page 52: Group 1. A has "sections darkening in KOH"(instead of, not darkening) and Group 2, "hyphae dichophytic" (instead of, dendroid).

He classed the spore size and shape among the characters of little taxonomic value, for all the spores of the species he studied were almost globose, not flattened at one side, and about (5.5–)6–6.5(–8) μ in diameter. Actually the spores are much more diverse than this, being, for instance, ellipsoid and adaxially flattened in *S. galactinum* and *S. odoratum*, and subclavate, 12–14 μ long in *S. praestans*. In *S. quaesitum* the spores are minutely asperulate. Some species (like *S. portentosum* and *S. quaesitum*) have amyloid spores.

Stereum duriusculum Berk. & Br. has been included as an original species in *Dichostereum* Pilát (*1926:* 223), but it is rather obvious that Pilát had *S. duriusculum* sensu Bres. in mind and that species belongs to *Vararia* P. Karst. *sensu lato*, like the rest of *Dichostereum*.

An important paper on *S. galactinum* and the closely related *S. odoratum* was recently published by L. T. White (*1951*). The first of these species may occur commonly as an organism responsible for root and butt rots in several coniferous species, in white pine in certain regions of Ontario, Canada. Its pathogenicity on apple trees and certain other hardwood species had already been known for some time. Cultural studies showed that it is heterothallic and of the tetrapolar type of interfertility.

Vararia P. Karst.

Langloisula Ell. & Ev. *in* J. Mycol. **5**: 68. 1889 (nomen confusum), in part. — Type species (only original species): *Langloisula spinosa* Ell. & Ev. (nomen confusum).

Vararia P. Karst., Krit. Öfvers. Finl. Basidsv. Tillägg 3: 32. 1898; Donk *in* Meded. Nederl. mycol. Ver. **18–20**: 191. 1931.—Type species (only original species): *Xerocarpus alutarius* (Berk. & C.) P. Karst. = *Vararia investiens* (Schw.) P. Karst.

Asterostromella Höhn. & L. *in* S.B. Akad. Wien, M.-n. Kl. I **116**: 773. 1907 (specific description only); *in* Wiesner-Festschr. 58. 1908. — Type species (only original species): *Corticium epiphyllum* "Pers.?" sensu Ravenel = *Vararia phyllophila* (Mass.) D. P. Rog. & Jacks.

As it has grown out to-day this genus is presumably heterogeneous, containing as it does at least one part that is closely related to *Scytinostroma* Donk (see p. 20), and another that has been assigned to the Xanthochroic series (= Hymenochaetaceae) by Corner (*1948*).

After the slight alteration that has been introduced at the Stockholm Congress in the Rule concerning nomina confusa it becomes necessary to re-examine such a name like *Langloisula* Ell. & Ev. (based on a single species, *L. spinosa* Ell. & Ev.). Its type specimen has been restudied and the results appear from the following notes:

It is probable, although far from certain, that Langlois's specimen consists of parasitized material, and that Ellis's generic and specific diagnoses took about equal cognizance of the fungus host and its most conspicuous parasite. The conidia of the latter resemble the spores of *Chromosporium viride* Corda sufficiently to suggest that the parasitic component may be a species of *Chromosporium*. The substratum of this parasitizing fungus both superficially and in its dichophyses, hyphae, and occasional thin-walled cystidia does not differ greatly from *Radulum investiens* [= *Vararia investiens* (Schw.) P. Karst.].—Rogers & Jackson (*1943:* 292–293). Compare also Von Höhnel (*1919*).

Since the "two entirely discordant elements" were supposed to form a single individual rather than two separate ones considered to belong to the same taxon, and since the original description "took about equal cognizance of the fungus

host and its most conspicuous parasite," both the generic and the specific name remain nomina confusa in the sense of the Rule concerned; compare the *Actinotinus* Example appended to Art. 76 (Code, 1952). The *Vararia* element could easily be selected as a "satisfactory type," but because such a procedure is rejected in the *Actinotinus* case, where the inflorescence of a *Viburnum* (inserted by a native collector into the terminal bud of an *Aesculus*) could have been chosen, such selection would be capricious in the present instance: both names should remain impriorable and good examples of nomina confusa. The somewhat similar case of *Pellicularia* Cooke has been extensively discussed by Donk (1954).

The generic name *Grandinia* Fr. (*1838:* 527) has been typified by *Thelephora granulosa* Pers. ex Fr. and the latter has been identified with a species of *Vararia*. However, we do not really know what *T. granulosa* sensu Fr. stands for and it is preferable to rule the name *Grandinia* out altogether as a nomen dubium (cf. Donk *1956b:* 77).

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GEASTRUM CAMPESTRE AUX PAYS-BAS

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Une espèce de *Geastrum* nouvelle pour le pays a été signalée

En y ajoutant *Astraeus hygrometricus* (Pers.) Morg., jusqu'ici 14 espèces du groupe *Geastrum* ont été récoltées dans les Pays-Bas.

Il faut dire qu'en général les *Geastrum* sont rares en Hollande. On les trouve surtout dans la région sableuse des dunes, souvent assez calcaire, qui borde la côte de la Mer du Nord. Mais même dans cette région la plupart des espèces sont assez rares et parmi celles qui se trouvent ça et là dans les dunes ou même dans le reste du pays le nombre d'exemplaires qu'on peut rencontrer n'est jamais considérable. Malgré les nombreuses excursions que nous avons faites, nous n'avons jamais vu dans une localité les centaines d'exemplaires que l'on cite de Hongrie et de la Tchécoslovaquie.

Bien que la région des dunes soit assez vaste et homogène, le nombre de localités et d'exemplaires reste limité. Dans le reste du pays la situation est encore plus défavorable. On peut en conclure que les conditions écologiques offertes par notre pays conviennent peu aux *Geastrum*. Il faut admettre qu'un certain nombre d'espèces peuvent s'établir et se maintenir dans le pays sans y trouver, cependant, les conditions d'un développement optimal. Sans doute existe-t-il souvent de grandes différences entre les biotopes des Pays-Bas et de l'étranger.

La nouvelle espèce signalée plus haut a été découverte en 1953 dans deux localités très éloignées. Il s'agit du *Geastrum campestre* (Morg.) Kambly & Lee (syn. *Geaster asper* Lloyd). Elle a été ramassée la première fois sur l'île de Vlieland par le Dr. L. D. Brongersma dans les dunes peu calcaires qui bordent la plage («Strandhoofd 30»), au milieu d'une végétation d'*Ononis repens* L. et de *Galium verum* L., le 18.VII.1953. Les deux exemplaires se trouvent dans la collection du Rijksherbarium, Leiden (L 953.112–453). La seconde récolte a été faite par nous-mêmes au cours d'une excursion avec le Dr. Mlle A. Jaarsveld dans les dunes sableuses calcaires de la prise d'eau d'Amsterdam, non loin du village de Vogelenzang, le long d'un sentier et aussi un peu à côté parmi les plantes basses et près de *Crataegus monogyna* Jacq. et *Sambucus nigra* L., le 13.XI.1953. Ensuite nous l'avons récoltée une troisième fois le 22.XI.1953 près du même endroit, également parmi les plantes basses et près des arbustes sus-indiqués. Les échantillons de cette localité se trouvent dans la collection de l'auteur, No. 1401–1407, et dans celle du Rijksherbarium (L 956. 148–180). Une quatrième récolte a été faite par M. P. Cornet dans les dunes de Bentveld près de Haarlem, le 8.X.1954, dont quelques exemplaires se trouvent également dans la collection du Rijksherbarium (L 954.236–189). Il est remarquable que malgré nos excursions nombreuses cette espèce n'a jamais été trouvée avant 1953.

Il faut observer que le *Crataegus monogyna* et le *Sambucus nigra*, ainsi que l'*Ulmus carpinifolia* Gled. var. *suberosa* Whlnbg. et l'*Euonymus europaeus* L.

semblent pouvoir former un biotope favorable à diverses espèces de *Geastrum*. En tout cas, on les trouve souvent ensemble. Sur ce même terrain, non loin de la localité de *G. campestre*, on trouve *Myriostoma coliforme* (Dicks. ex Pers.) Cda., *Geastrum striatum* D.C. (= *bryantii* Berk.), *G. coronatum* Pers. (= *limbatum* Fr.), *G. mammosum* Chev. et *G. triplex* Jungh. Dans un tel biotope on peut s'attendre à trouver en outre *G. saccatum* Fr.

Plusieurs auteurs considèrent comme des synonymes le *G. campestre* et le *G. asper*. Après étude, j'ai abouti à la même conviction. J'ai pu comparer le matériel suivant:

1. Deux exemplaires d'Allemagne (Berlin) et un de Tchécoslovaquie qui m'ont été aimablement prêtés par le Dr. Br. Hennig.

2. Ex Herb. Dr. V. J. Staněk. *Geastrum campestre* (Morg.) Kambly-Lee. Locis stepposis aren. prope Malacky, Slovakia merid. 6.11.1953, leg. *L. Staňková* & Dr. *V. J. Staněk*, det. Staněk (L 953.220–065).

3. Herb. Zd. Moravec 280/53. *Geastrum campestre* (Morg.) K.-L. Bohemia media, in valle sti Prokopii in merid. a Praga, locis aridis stepposis, solo calcario, 300 m.s.m., 2.10.1953, leg. et det. *Zd. Moravec* (L 953.220–058).

4. J. F. Brenckle, Fungi dakotenses 35. *Geaster asper* Mich., Waste places, Kulm, Oct. 1908 (L 910.221–478).

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6. Ellis & Everhart, North American Fungi. Second Series. 3515. *Geaster campestris*, Morgan. Journ. Cin. Soc. Nat. Hist. 1889, p. 14. On the ground. Long Pine, Nebr., Oct. 1896, Rev. *J. M. Bates* (L 910.221–461).

7. Sydow, Fungi exotici exsiccati 151. *Geaster asper* Mich. in Nov. Plant. genera 1729, p. 220. America bor.: pr. Kulm, North Dakota. Ad terram, 2.4.1912, *J. F. Brenckle* (L 912.324–110).

D'après la littérature et les échantillons étudiés, nous constatons la distribution suivante:

Afrique du Sud (Cunningham).
Amérique du Nord: Kansas, Nebraska, North Dakota, Texas, Utah.
Australie (Cunningham).
Europe: Allemagne (diverses localités, toujours rare), Hongrie (parfois des centaines), Pays-Bas (3 localités), Russie, Tchécoslovaquie (parfois des centaines).

G. campestre est bien caractérisé par son endoperidium pédicellé, rendu rugueux par de petites granules, et par son exoperidium nettement hygroscopique. Ces caractères le séparent du *G. nanum* Pers. qui du reste lui ressemble beaucoup. Les laciniures de l'exoperidium, en séchant, se recourbent à moitié, de sorte que ses pointes atteignent à peu près le pédoncule du fruit interne. Il arrive parfois que les laciniures s'approchent aussi de l'endoperidium (c'était le cas pour les deux exemplaires de Vlieland), mais on ne verra jamais un recourbement parfait comme nous le connaissons de *Geastrum mammosum*, *Astraeus hygrometricus*, etc. Du reste, d'après des exemplaires secs, *G. campestre* est caractérisé comme suit:

Petite espèce, exoperidium fendu en 7–10 laciniures, diamètre à l'état humide d'env. 30 mm, couleur brun foncé quand il est humide, plus clair quand il est sec, face exté-

rieure de l'exoperidium couverte de débris du substratum. Endoperidium env. 10–12 mm de diamètre, brun foncé ou brun clair à l'état humide, devenant plus clair en séchant, pédoncule court et robuste, les granules serrées. Péristome en forme de cône, plissé, nombre de plis env. 15, le bord bien différencié de l'endoperidium. Spores grandes pour un *Geastrum*, diamètre env. 6 μ, à verrues bien distinctes.

Les spores séparent également notre champignon du *G. nanum*, ce dernier ayant des spores d'env. 5 μ de diamètre à petites verrues très fines.

Des bonnes figures ont été publiées par Coker (Pl. 24, en bas), Cunningham (Pl. 24, fig. 1; Pl. 25, fig. 6; Pl. 36, fig. 22), Eberle (fig. 3, 6h, i, k, l), Hollós (Pl. 9, fig. 12–14, 21–22; Pl. 29, fig. 24–25), Lloyd (fig. 28–30), Micheli (Pl. 100, fig. 2), Morgan (1889, Pl. 1), et Staněk (p. 118–119, fig. 1–2).

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TAXONOMICAL NOTES ON MOLLISIACEOUS FUNGI—III

The polyphagous species Mollisia pastinacae Nannfeldt

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(With 3 Text-figures)

Mollisia pastinacae Nannf., formerly only described from *Pastinaca sativa*, appears to be a rather common and polyphagous organism. It inhabits previous year's stems of plants belonging to various families, viz. Umbelliferae, Compositae and Urticaceae.

Mollisia pastinacae Nannf. doubtless belongs to the category of fungi described under the name *Mollisia atrata* (Pers.) P. A. Karst. Unfortunately, the original description by Persoon (1801) lacks sufficient detail, only stating: "*Pez. atrata:* Sessilis subglobosa nigrescente-subolivacea: ore connivente albicante. Vere ad truncos putridos invenitur. Parva concava, glabra, subglaucescens." Evidently Persoon's species did not occur on previous year's *herbaceous* stems, but on *woody* tissues instead.

A great many of small fungi, macroscopically resembling Persoon's species, were afterwards described and regarded as identical with *Mollisia atrata*.

Nannfeldt (1928, 1932, 1936) investigated many of these fungi and clearly demonstrated that *Mollisia atrata* is a complex species, consisting of a number of distinct taxa: "... habe ich mich von der Notwendigkeit überzeugt diesen letztgenannten Namen gänzlich fallen zu lassen. Abgesehen davon, wie ungewiss es ist, welche Art oder Arten Persoon unter seiner *Peziza atrata* verstand, so ist später der Name *M. atrata* als ein Sammelname für mehrere *Mollisia* – und *Pyrenopeziza* – Arten gebraucht worden, und zwar teils für solche, die gewissen Substraten eigen (monophag) sind, und von denen die Mehrzahl bereit beschrieben, andere aber noch unbeschrieben sind, teils auch für "verirrte Apothecien verschiedener, mehr oder weniger polyphager Arten."

Although Nannfeldt's new conception of the species *Mollisia atrata* was great progress in our knowledge of the smaller, inoperculate Discomycetes it was not accepted by recent American (Seaver, 1951) and French (Le Gal 1939 and Grelet, 1953) mycologists.

Since *Mollisia atrata* is a nomen dubium, it must be rejected, whereas it became necessary to split up the complex into a number of well-defined species, one of which is *Mollisia pastinacae* as understood by Nannfeldt. This species, although originally collected on the host *Pastinaca sativa*, appears to be of a polyphagous nature. Up to the present it has also been recorded from the following hosts: *Angelica sylvestris*, *Anthriscus sylvestris*, *Arctium tomentosum*, *Bidens cernuus*, *Cirsium arvense*, *Heracleum mantegazzianum*, *Heracleum sphondylium*, *Mentha* spec., and *Urtica dioica*. *Mollisia pastinacae* is often found on plant debris in so-called ruderal vegetations.

Mollisia pastinacae Nannf.

Mollisia pastinacae Nannf. *in* Nova Acta reg. Soc. Sci. upsal. ser. 4, **8** (2): 127. 1932. — Type: non vidi; UPS.

Description.—See Nannfeldt (1932).

Supplementary description.—Nannfeldt reported the asci and ascospores to measure 40 – 45 × 5 μ and 6 – 7 × 1.5 – 2 μ respectively, but it should be born in mind that his measurements were taken from material from a single host (*Pastinaca*) collected in one locality (Sandgropen). On investigating, however, the apothecia from various hosts and localities, it was observed that the measurements of both asci and ascospores have a wider range, being 38 – 53 × 4 μ, and (5.7) 7.6 – 9.5 (11.4) × 2 – 2.8 μ respectively.

Authentic material.—Flora Suec. 1906 (*paratype;* author's herb., UPS) Flora Suec. 1907 (*isotype;* author's herb., UPS).

Denmark: Sjaelland, Køge, Mosede Strand, 31 V 1955, *Gremmen 1203*, on *Angelica sylvestris* (author's herb.); 2 VI 1955, *Gremmen 1205*, on *Heracleum mantegazzianum* (author's herb.); 5 VI 1955, *Gremmen 1202*, on *Bidens cernuus* (author's herb.); *Gremmen 1180*, *1192*, on *Arctium tomentosum* (author's herb.); *Gremmen 1204*, on *Anthriscus sylvestris* (author's herb.).

Great britain: Yorkshire, Ripon, VIII 1952, *Graddon 664*, on *Arctium lappa* (author's herb.).

Netherlands: Gelderland: Neerijnen, Dijk, 17 VII 1955, *Gremmen 1148*, on *Arctium major* (author's herb.); Neerijnen, Repelse Bos, 17 VII 1955, *Gremmen 1157*, on *Cirsium arvense* (author's herb.), *Gremmen 1158*, on *Heracleum sphondylium* (author's herb.), *Gremmen 1150*, on *Arctium* spec. (author's herb.); Neerijnen, "Weldam", VIII 1953, *Gremmen 704*, on *Heracleum* spec. (authors' herb.); Renswoude, 14 VIII 1955, *Gremmen 1164*, on *Senecio paludosa* (author's herb.); Tricht, "Marienwaard", 3 VII 1951, *Gremmen 788*, on *Cirsium arvense* (author's herb.); Wageningen, "De Dorschkamp", 8 VI 1948, *Gremmen 587*, on *Urtica dioica* (author's herb.).

Noord-Holland: Amsterdam, Amsteldijk, 29 V 1950, *Gremmen 528*, on *Anthriscus sylvestris* (author's herb.).

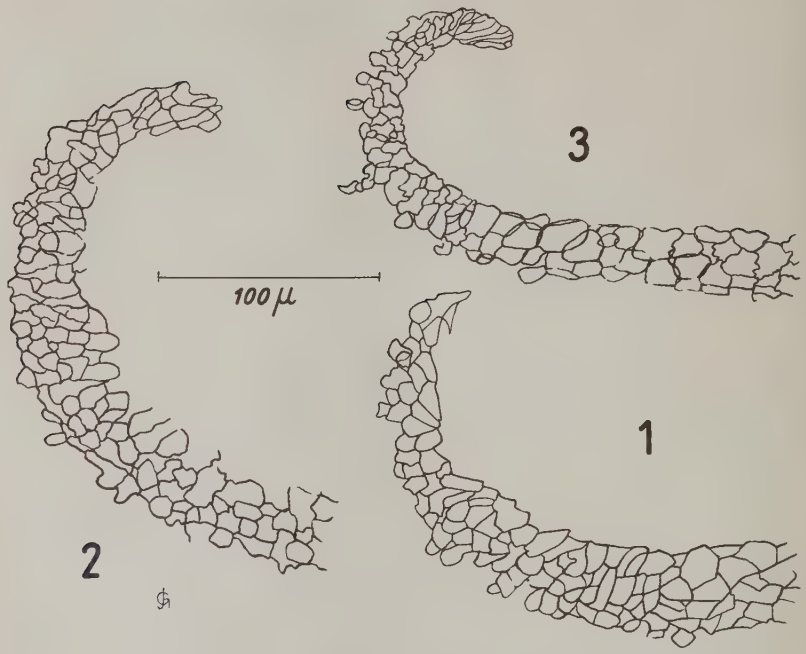
Noord-Brabant: Dorst, Leemkuilen, 16 V 1956, *Maas Geesteranus 11556*, on *Cirsium palustre* (L).

Sweden: Flora Suec. 5150, as *Mollisia depressula* (Nyl.), on *Arctium*; Flora Suec. 9501, as *Mollisia* spec., on *Angelica*; Fgi. Suec., Uppland, Uppsala, Sandgropen, 17 VI 1935, *Seth Lundell*, on *Arctium*.

Switzerland: Oberwallis, Zennbinn, 3 IX 1955, *Gremmen 1209*, on *Arctium* spec. (author's herb.), *Gremmen 1211*, on *Mentha* spec. (author's herb.).

Cultures.—By means of ejaculating ascospores cultures were obtained from numbers 528 and 704. In both cases the fungus developed a rather quickly growing mycelium. The aerial mycelium was greyish and very abundant, the ground mycelium much darker, whereas the agar turned very dark brown by a pigment. Mature apothecia were formed on maltagar, as well as on sterilized stems of lupine and nettle after about 80 days, but never on cherry decoction agar.

Discussion.—As *Peziza depressula* Nyl. was supposed to be identical with *M. pastinacae* Nannf., I tried to obtain the original material of Nylander for investigation, but failed to trace it. Since, however, Nylander (1869) cited Fries Scl. Suec. 452 (as *Peziza atrata*) as identical with his own species, material of Fries was asked on loan. Through the kindness of Dr R. W. G. Dennis (Kew) I had the opportunity of studying part of this material.



Figs. 1–3. *Mollisia pastinacae* Nannf.
Fig. 1. Exciple of apothecium on *Anthriscus sylvestris* (*Gremmen 528*).
Fig. 2. Exciple of apothecium on *Urtica dioica* (*Gremmen 587*).
Fig. 3. Exciple of apothecium on *Cirsum arvense* (*Gremmen 788*).

The folder contains two different kinds of stems, one of them being a ribbed stem -- probably of *Angelica* -- bearing pycnidia with one-celled, hyaline, ovate pycnospores (*Phoma?*), beside a few small, immature very dark brown apothecia. The other stem which is glabrous also bears some small apothecia, but these, too, are immature and remained unidentified. Dr Dennis already wrote to me: "It appears that different examples of Fries's Scl. Suec. 452 may include different fungi." Although Fries's material could not be identified, I am satisfied that at least Kew's set of Scl. Suec. 452 is quite different from *Mollisia pastinacae* Nannf. It would seem unlikely that other sets of this number will give any better clue as to Fries's material being identical with *P. depressula*. As, moreover, already Nannfeldt (1928) stated that there exists much confusion about Nylander's species, it seems best to consider *Peziza depressula* a nomen confusum.

Mollisia pastinacae Nannf. is a variable Discomycete, which may in part be ascribed to external conditions: the substratum may be poor or rich in nutritious substances; the amount of rain governs the moistness of the substratum; the density of the apothecia pro cm^2 affects the size so that crowded fructifications are smaller than those with sufficient room for development.

In part the variability may be explained by the alteration of the apothecial structure during its growth. In nearly all collections the cortex of the exciple is without cell-outgrowths, but in one (*Gremmen 1192*) from Denmark on *Arctium*, various apothecia showed greenish grey cell-projections. In the initial stage the apothecia were seen to be surrounded by a very delicate greyish green subiculum-like mycelium, the hyphae of which are connected with the cortex and the margo. After flattening of the fructifications these hyphal connections are ruptured and remnants of this tissue may be observed as the above mentioned cell-outgrowths at the cortex of the exciple. After ageing these hyphae often disappear leaving a glabrous exciple.

Acknowledgements.—The author is very much indebted to Prof. Dr J. A. Nannfeldt (Uppsala) for the gift of various species of *Mollisia* and *Pyrenopeziza* from his own collections, including the paratype and isotype of *Mollisia pastinacae* Nannf. Dr R. W. G. Dennis (Kew) kindly sent Fries, Scler. Suec. 452 on loan for investigation. The Danish collections mentioned in this short paper were made together with Dr M. Skytte Christiansen (Copenhagen) during a stay in the environs of Køge (Sjaelland) in 1955. I am very grateful to Dr R. A. Maas Geesteranus for critically revising the manuscript.

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TAXONOMICAL NOTES ON MOLLISIACEOUS FUNGI—IV

Species inhabiting previous year's stems of Epilobium and Ulmaria

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(With 2 Text-figures)

This paper deals with six species of the genus *Mollisia* viz. *M. clavata*, *M. chamaenerii*, *M. revincta*, *M. pulveracea*, *M. millegrana* and *M. lanceolata* spec. nov., some of which are not yet known from The Netherlands.

Material for study of the species treated in this paper has been received on loan from: Dr S. Ahlner, Naturhistoriska Riksmuseum, Botanical Department, Stockholm (S); Prof. Dr Ch. Baehni, Institut de Botanique de l'Université, Genève (G); Prof. Dr R. Heim, Laboratoire de Cryptogamie du Muséum National d'Histoire Naturelle, Paris (PC); Dr R. A. Maas Geesteranus, Rijksherbarium, Leiden (L); Dr N. Malmström, Botanical Museum, Helsinki (H); Dr Zd. Moravec and Dr M. Svrček, Botanical Department of the National Museum, Prague (PR); Dr E. Müller, Institut für spezielle Botanik der Eidgenössischen Technischen Hochschule, Zürich (ZT); Prof. Dr J. A. Nannfeldt, Universitetets Botaniska Museum, Uppsala (UPS); Sir E. Salisbury and Dr R. W. G. Dennis, The Herbarium, Royal Botanic Gardens, Kew (K); Mr W. D. Graddon, Congleton (GRD).

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Key to the species treated

1a. Paraphyses filiform 2
2a. Ascospores 5–12 μ long 3
3a. Apothecia laterally without excrescences 4
4a. Apothecia marginally without dark brown longitudinal cells 5
5a. Apothecia reddish brown, asci 40–50 μ long . . . . . *M. revincta* (3)
5b. Apothecia light brown, asci 28–36 μ long . . . . . *M. chamaenerii* (2)
4b. Apothecia marginally with dark brown longitudinal cells . *M. pulveracea* (4)
3b. Apothecia laterally with excrescences . . . . . *M. clavata* (1)
2b. Ascospores 12–18 μ long . . . . . *M. millegrana* (5)
1b. Paraphyses lanceolate . . . . . *M. lanceolata* (6)

1. Mollisia clavata Gremmen

Mollisia clavata Gremmen *in* Fungus **24**: 5. 1954.—Holotype: *Mollisia minutella* (Sacc.) Rehm *in* Sydow, Mycol. Germ. 3147 (L).

Illustration.—*In* Fungus **24**: 3. 1954.

Apothecia greyish blue, velvety, after ageing much darker to black, 600–700 μ in diam., sometimes with brownish hyphae at the base. Exciple with textura globulosa, dark brown, 40–60 μ at the base, consisting of brown, angular excipular cells, 7–11 μ in diam., laterally much thinner, marginally with hyaline or light brown club-shaped cells. Cortex of the exciple covered with numerous hyaline, papillate cell-outgrowths,

8–10 μ long. Hypothecium colourless. Hymenium colourless or slightly yellow, about 50 μ. Asci 46.7–47.1 × 3.8–4 μ. Ascospores 7.7–8.6 × 2 μ, colourless, one-celled. Paraphyses colourless, filiform. (Description of the type.)

Authentic material.—Sydow, Mycol. Germ. 3146, *Mollisia minutella* (Sacc.) Rehm L, S).

Specimens examined.—Ex Herb. Rehm (66), Fgi. caucas., *Mollisia cinerea* var. *minutella* (S); Rabh. Fgi. Eur. 1643, *Niptera cinerea* (L, S); Ex Herb. C. Crossland 2012, *Mollisia dilutella* pr. p. (K); Ex Herb. Krypt. Mus. Nat. Prag. Flora Bohem. 274/49, *Mollisia* species, leg. Svrček (PR); Author's Herbarium 542 (Dutch collection on *Rubus*) and 1160 (Danish collection on *Epilobium*).

The first report of this fungus is from *Rubus* (Gremmen, 1954a), on which it was found growing together with *Mollisia revincta*. Sydow mentions *Epilobium hirsutum*, *Cirsium palustre* and *Staehys palustris* as hosts, but I am in doubt whether *M. clavata* occurs on *Cirsium* and *Stachys*. On *Epilobium* this species is a regular inhabitant of last year's stems, especially on *Epilobium hirsutum*.

This fungus is characterized by its velvety appearance due to numerous minute, colourless cell-outgrowths on the outermost layer of the exciple.

Peziza dilutella Fries is a doubtful synonym as was kindly informed by Prof. Nannfeldt. He asserts: "Unfortunately, there is no specimen left of *Peziza dilutella* Fr., so this name must remain doubtful. If I should venture a guess, I should think that *Mollisia revincta* or a similar species is intended, but I think we had better abandon Fries's name totally." Of *Mollisia dilutella* Phill. there exist three collections in Herb. C. Crossland (K). One collection, found at Hornsea, is identical with *Mollisia clavata*. A second folder contains *M. revincta*, whereas the third collection is neither *M. clavata*, nor *M. revincta* and up till now remains unidentified.

As for *Mollisia dilutella* Gill., Prof. Heim kindly informed me that there is no material of that species to be found in the Museum. From Herbarium Fuckel (G) three collections under the name of *Peziza dilutella* Fr. [= *Pezizella* (Fr.) Fuck.] were studied which were collected on "*Alsineae*" and "*Cerastium*". All proved to be *Fabraea cerastiorum* (Wallr.) Rehm.

The epithet *dilutella* was used by Rehm (1896) in the combination *Niptera dilutella* (Fr.) Rehm, but obviously he did not see the original material, referring to Fries's description only: "Dasselbe stimmt sehr gut zu der, wenn auch dürftigen Beschreibung bei Fries, welcher seine Art zwischen *Pez. atrata* und *cinerea* stellt."

2. **Mollisia chamaenerii** (Nannf.) Gremmen *comb. nov.*

Pyrenopeziza chamaenerii Nannf. *in* Svensk bot. Tidskr. **22**: 134. 1928.

Peziza ebuli Karst., Mon. Pez. fenn. 160. 1869. — Type: *Peziza ebuli* Karst., ad *Epilob.*, 31/5. 1869, Tammela, Mustiala, Finland.

Illustration.—See Nannfeldt (1932: 143).

Apothecia gregarious, 200–400 μ in diam., light brown, developing sub-epidermally. Exciple with textura globulosa, light brown, 20–25 μ at the base, laterally thinner, consisting of uniform, angular excipular cells, measuring 3–6 μ in diam. both at the base and at the sides, marginally with colourless, longitudinal groups of cells. Hypothecium colourless, 10–12 μ. Hymenium 23–30 μ, colourless. Asci (28.8) 32.7–36.5 × (3.5)4.5–4.8 μ. Pore blue with J. Ascospores (6.7)7.7–8.6 × 2 μ, colourless, one-celled. Paraphyses hardly discernible. (Description after Karsten's material.)

SPECIMENS EXAMINED.—Flora Suec. 760, *Pyrenopeziza chamaenerii* (UPS); Fgi. Suec., *Pyrenopeziza chamaenerii*, 17/7. 1952, leg. *Holm* (UPS); Ex Herb. E.T.H., *Pyrenopeziza chamaenerii*, 25/5. 1953, leg. *Müller* (ZT); *Pyrenopeziza chamaenerii*, 15/6. 1931, leg. *Eliasson* (S).

This species is characterized by its minute, black fructifications which in a young stage suggest small perithecia developing beneath the epidermis and rupturing this tissue at maturity.

Karsten (1869) originally described the fungus as *Peziza ebuli* Karst., but afterwards (1871) considered it a subspecies of *Mollisia atrata* and synonymous with *Peziza atrata* var. *β ebuli* Fr. Nannfeldt (1928) demonstrated that Karsten confused two different species viz. a species on *Sambucus Ebulus*, now recognized as *Pyrenopeziza ebuli* (Fr.) Sacc., and a species on *Chamaenerium* (= *Epilobium*), namely *Pyrenopeziza chamaenerii* Nannf. Nannfeldt (1932) in giving a detailed description of the structure of the apothecia of *Pyrenopeziza chamaenerii* reported: "Ihrem Bau nach stimmt diese Art am nächsten mit *P. ebuli* überein, unterscheidet sich aber von ihr ausser durch das Substrat auch durch die grösseren und kräftigeren Apothecien."

Pyrenopeziza galii-veri (Karst.) Sacc. is related to *Mollisia chamaenerii*. The former, however, has much larger ascospores, ranging from 15–24 × 2–2.5 μ.

Up to the present *Mollisia chamaenerii* has not been found in The Netherlands.

3. MOLLISIA REVINCTA (Karst.) Rehm

Mollisia revincta (Karst.) Rehm *in* Krypt. Fl. **1** (3): 1264. 1896. — *Peziza revincta* Karst., Mon. Pez. fenn. 157. 1869. — *Mollisia cinerea* var. *revincta* Karst., Mycol. fenn. **1**: 190. 1871. — Type: *Peziza cinerea revincta* Karst. (H).

Niptera cinerea var. *minutella* Sacc. *in* Michelia **2**: 611. 1882. — *Mollisia minutella* (Sacc.) Rehm *in* Krypt. Fl. **1** (3): 525. 1896.

ILLUSTRATION.—*In* Fungus **24**: 3. 1954.

SPECIMENS EXAMINED.—Gelderland: Doorwerth, "Italiaanse weg", 18 VIII 1954, *Gremmen 775* on *Epilobium* (author's herb.); Ede, Edese Bos, 16 VIII 1953, *Gremmen 695*, on *Epilobium* (author's herb.); Neerijnen, Repelse Bos, 18 VII 1954, *Gremmen 1154*, on *Ulmaria* (author's herb.); Renkum, "Keyenberg", X 1953, *Gremmen 731*, on *Epilobium* (author's herb.); Renkum, "Oranje Nassau's Oord", 6 X 1953, *Gremmen 719*, on *Epilobium* (author's herb.); Wageningen, langs de Grift, 11 VII 1954, *Gremmen 759*, on *Ulmaria* (author's herb.).

Mollisia revincta, as has already been reported on two earlier occasions (Gremmen, 1954a, 1955), is a very polyphagous species, being known from *Achillea*, *Centaurea*, *Eupatorium*, *Hieracium*, *Rubus*, and *Tanacetum*. The collections mentioned above are from previous year's stems of *Epilobium* and *Ulmaria*.

4. MOLLISIA PULVERACEA (Fuck.) Rehm.—Fig. 1

Mollisia pulveracea (Fuck.) Rehm *in* Krypt. Fl. **1** (3): 532. 1896. — *Peziza pulveracea* Fuck., Symb. mycol. 297. 1870. — Type: *Peziza pulveracea* Fuck, Fgi. rhen. 2191, ad *Spiraeae Ulmariae* caules putridos, raro vere Ca Hostrichiam (G).

Apothecia gregarious, very minute, globular, black, 100–150 μ across. Exciple with textura globulosa, 20 μ thick both at the base and at the sides, consisting of minute, angular cells, measuring 3–5 μ in diam., marginally with brown longitudinal cells. Asci 27 × 4–5 μ. Ascospores 4.8–5.7–6.7 × 1–1.9–2.8 μ, colourless, one-celled. (Description after the type.)

SPECIMENS EXAMINED.—Flora Suec. 8356, *Mollisia pulveracea*, leg. *Nannfeldt* (UPS); Ex Herb. I.M.I., 35021, *Mollisia* species, leg. *Ellis* (IMI); Ex Herb. Cryptog. Inst. Bot. Univ. Carol. Praha, *Mollisia* species, 117/55, leg. *Moravec* (PR); Author's Herbarium *1185* (Danish collection).

The diagnosis on the folder given by Fuckel runs: "Cupulis gregariis, minutissimis, punctiformibus, primo clausis, globosis, demum apertis, margineque atro-griseis, nigro-granulatis, disco griseo; ascis globosis, sessilibus, 8 sporis, 24 Mik. longis., 6 Mik. crass., sporidiis oblongo-clavatis, simplicibus, hyalinis; c.a. 8–10 Mik. long.; paraphysibus simplicibus, asci longitudine."

Mollisia pulveracea has not been found in The Netherlands up till now.

5. MOLLISIA MILLEGRANA (Boud.) Nannf.

Mollisia millegrana (Boud.) Nannf. *in* Nova Acta reg. Soc. Sci. upsal. ser. 4, **8** (2): 127. 1932. — *Pyrenopeziza millegrana* Boud., Hist. Classif. Discom. Eur. 133. 1907. — Type: *Pyrenopeziza millegrana* Boud. (non vidi!).

ILLUSTRATION.—Boudier, Icon. mycol. **3**: pl. 552. 1905–1910 (*Pyrenopeziza*).

SPECIMENS EXAMINED.—Flora Suec. 4315, *Mollisia millegrana* (UPS); Ex Herb. I.M.I., 35021, *Mollisia* species, leg. *Ellis* (IMI).

Unfortunately the type could not be studied. Prof. Heim kindly informed me that it is missing in Boudier's Herbarium. For a description of the apothecial structure I may refer to Nannfeldt (1932).

Up till now this fungus has not been collected in The Netherlands.

6. **Mollisia lanceolata** Gremmen *spec. nov.*—Fig. 2

Apothecia minuta, 300–600 μ lata. Excipulum e textura globulosa, cellulis exterioribus phaeis vel badiis, rotundis vel angulatis vel polyedricis. Asci clavati, 30 × 7.6 μ. Ascosporae 7–8 × 2 μ, simplices, incoloratae. Paraphyses lanceolatae, incoloratae. In caulibus *Ulmariae palustris*.

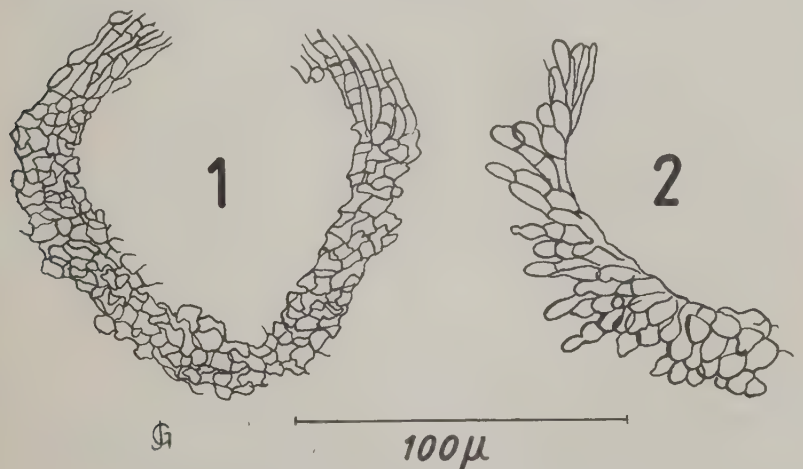

Fig. 1. *Mollisia pulveracea* (Fuck.) Rehm: section of excipulum (type).
Fig. 2. *Mollisia lanceolata* Gremmen: section of excipulum (type).

Apothecia scattered, dark brown, 300–600 μ across, with a white margo. Exciple with brown textura globulosa, 20–25 μ at the base, consisting of 3–4 rows of angular excipular cells, 11–15 μ, brown in the outermost layer, but gradually becoming lighter brown to hyaline in the inner part of the exciple. The cortex of the exciple with globular or pear-shaped cells, often 2–3 in short chains. Margo with colourless, club-shaped cell-outgrowths. Hypothecium colourless, 30–40 μ. Hymenium colourless, 30 μ. Asci 30 × 7.6 μ, clavate. Ascospores 7–8 × 2 μ, colourless, one-celled. Paraphyses colourless, lanceolate, exceeding the asci by 10–15 μ.

SPECIMENS EXAMINED.—Gelderland: Neerijnen, Repelse Bos, 17 IX 1956, Gremmen *1271*, on previous year's stem of *Ulmaria palustris* (author's herb.); Renswoude, 8 VIII 1953, *Gremmen 690*, on previous year's stems of *Ulmaria palustris* (*type*, author's herb.).

EXCLUDED SPECIES

MOLLISIA ULMARIAE (Lasch) Rehm

Mollisia ulmariae (Lasch) Rehm *in* Krypt. Fl. **1** (3): 531. 1896. — *Peziza ulmariae* Lasch *in* Flora **36**: 201. 1853. — Type: *P. ulmariae*. Ad caul. emort. *Spiraeae Ulmariae* pr. Driesen (Klotzsch, Herb. Viv. Myc. no. 1723).

Apothecia 200–400 μ across, sessile, lemon-yellow to orange-yellow, afterwards brown or orange-brown. Margin of the apothecia pulverulent. Exciple with short 7–10–15 μ long, hyaline, curved cell-outgrowths which are broad at the base and pointed at the top. Asci 27–42 × 4–6 μ, pore blue with J. Ascospores (11.5) 12.5–13.3 (15.4) × 1.5–1.9 μ, one-celled, hyaline or filled with yellowish guttulae, pointed, 4 or 8 spores per ascus. Paraphyses filiform, with or without oil-droplets.

According to Nannfeldt (1936) *Mollisia ulmariae* is "only a slight modification of *M. pulveracea*" and further "the true *Peziza ulmariae* Lasch is according to the description and authentic specimens in Klotzsch, Herb. Viv. Myc. no. 1723, and Rabenhorst, Herb. Myc. II. no. 629, the same fungus that Karsten later described as *Peziza deparcula*." After re-examination of the material of Lasch and Karsten I can fully support Nannfeldt's view. Since *Peziza ulmariae* is no *Mollisia*, but a *Hyaloscypha* instead, and the epithet *ulmariae* antedates the epithet *deparcula* (Mon. Pez. fenn. 191. 1869), the correct name of the fungus is *Hyaloscypha ulmariae* (Lasch) Nannf.

As this fungus was observed to develop 4-spored and 8-spored asci, 4-spored specimens do not merit special valuation. I therefore consider *Urceolella ulmariae* var. *tetraspora* Boud., the type of which was received on loan from Boudier's Herbarium (PC), identical with the present species. The same is true of *Gremmen 688* (cf. Gremmen, 1954b) named *Urceolella ulmariae* Boud., as well as *Gremmen 692*, *701*, *1156*, *1161*, and *1165*. A British collection from Herb. Graddon (GRD *1025*) also belongs here.

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THREE REMARKABLE WHITE-SPORED AGARICS COLLECTED IN SWITZERLAND

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(With 12 Text-figures)

The new combination *Lyophyllum alpestre*, and two new species, viz. *Cystoderma superbum* and *Mycena atrochalybaea*, are proposed, and the difference from related species is discussed.

During a stay at Schüpfheim, Canton of Luzern, Switzerland, from the 10th of August to the 15th of September, 1955, and a preceding reconnaissance of a few days in September, 1953, many interesting agarics were collected by Mr J. van Brummelen, Mrs A. W. Huijsman, and myself. A great number of these were described and painted in water-colours on the spot and were dried thanks to facilities extended by Mrs Eicher, to whose kindness we are very much indebted.

Most of the fungi were collected at an altitude of about 800 m. in *Picea* forests, with scattered trees of *Abies* and *Fagus*, and with a very rich vegetation of *Sphagnum*. The local climate is rather rough and cold and very wet. It is significant to notice that at the altitude mentioned *Cortinarius subtortus* proved to be a rather common species which Moser (1952) reports not to have met below 1400 m. in Tyrol.

The "Goberwald" was visited twice. It is a mixed forest on rich soil near Romoos, also at 800 m. altitude, with *Fagus* and *Picea* predominating, and the typical beechwood-undergrowth.

I wish to express my indebtedness to Dr R. W. G. Dennis, the Herbarium, Royal Botanic Gardens, Kew, Dr J. Favre, Geneva, and Dr M. Locquin, Paris, for supplying the information for which I asked.

Lyophyllum alpestre (Britz.) *comb. nov.*—Figs. 7–8

Agaricus alpestris Britz., Hym. Südb. **8**: 4, fig. 442. 1891 (n.v.). & *in* Bot. Centralbl. **73**: 173. 1898. — *Clitocybe alpestris* (Britz.) Sacc., Syll. Fung. **11**: 15. 1895. — *Calocybe alpestris* (Britz.) Sing. *in* Ann. mycol., Berl. **41**: 108. 1943 (misapplied).

Two fruit-bodies connate at base. *Pileus* up to 32 mm. wide, subconical to planoconvex, slightly umbonate, margin flatly curved, somewhat lustrous, dry, under the lens silky-fibrillose, sordid pinkish-flesh-coloured to „jaune-indien" (Séguy 202), centre more ochrous; flesh very thick at disc, tapering abruptly towards margin, white, odour farinaceous, taste farinaceous to slightly bitter. *Gills* crowded, emarginate-adnate, up to 4 mm. broad behind, gradually attenuating in front, cream-isabelline, lacerate-eroded. *Stem* up to 75 × 4.5 mm., collybioid, equal, flexuose, fistulose, sulcate-striate, glabrous, base at most slightly white-felted but not lanate-tomentose, white, at middle with a flesh-coloured hue within and without.

Spores 3.4–4.0 × 2.9–3.8 μ, subglobose, non-amyloid, irregularly dotted with remnants of perispore or naked. Basidia 17–23 × 5–6 μ, 4-spored, subclavate, with carminophilous granules, with clamps at base. Pleurocystidia and cheilocystidia lacking. Subhymenium narrow, about $^1/_3$ of thickness of hymenium. Trama of gills regular,

hyphae up to 12 μ wide. Superficial layer of pileus composed of more or less radially arranged hyphae, 3–6 μ in diameter, with many clamps and, presumably, with a dubious epimembranal pigment. Flesh of pileus composed of irregularly interwoven hyphae, 7–12 μ in diameter.

HABITAT.—In *Picea* forest.

SWITZERLAND: Canton of Luzern: near Schüpfheim, 11 VIII 1955, *H. S. C. Huijsman* (L 955. 200–058).

This species macroscopically resembles *Calocybe persicolor* (Fr.) Sing. which is known to the present author. It agrees in the colour of the cap and in the collybioid stem, but differs in the absence of a hirsute woolliness at the basal part of the stem. Microscopically it is sharply distinguished from the latter and other closely related species by the subglobose spores, most of which are remotely verruculose by remnants of the inner perispore.

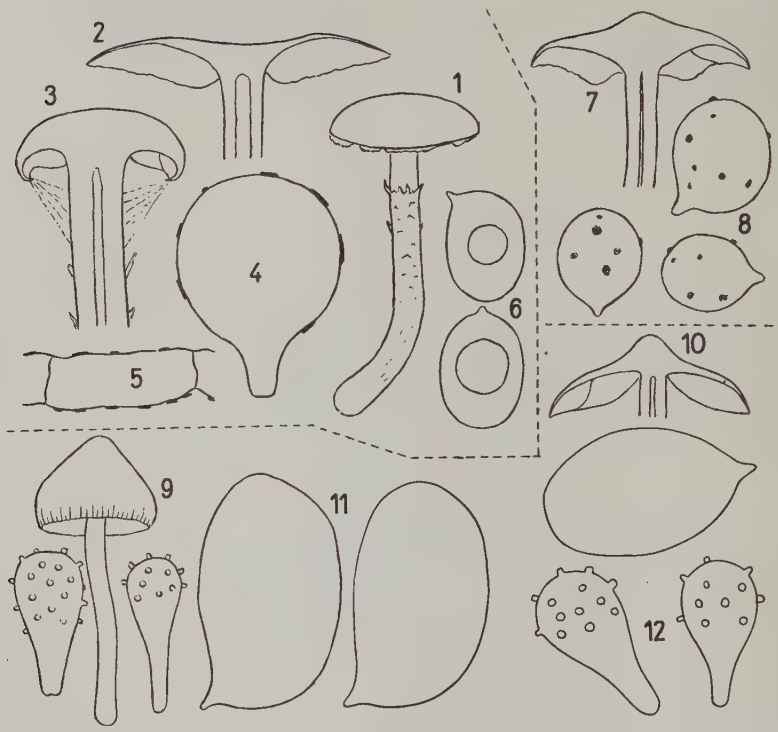
When it is permitted to assume that Britzelmayr's *Agaricus alpestris* belongs to *Calocybe* Kühner (1938), then it is extremely probable that the Swiss plant is identical with the Bavarian one. In this respect it is of paramount importance that Britzelmayr in his description makes mention of rough, globose spores. It is true that there are some discrepancies between Britzelmayr's description and that of the present mushroom, but these mainly concern characteristics of minor importance (diameter of cap, length of stem) or such as are more or less subject to personal appreciation (odour, crowding of gills).

Calocybe alpestris (Britz.?) Sing. sensu Singer (the question-mark is Singer's) is characterized by the presence of small but ellipsoid (3.3 – 4 × 1.8 – 2.5 μ), as well as smooth spores. This and the colour of the pileus (which Britzelmayr described as "gelbrothbraun" and Singer as "eigelb mit bräunlicher Nuance bis lederbräunlich") conflict with Britzelmayr's description. Moreover, Singer's species largely differs from the Swiss plant by the presence in the surface of the cap of sphaerocysts interspersed between the cylindric hyphae.

It is only after considerable hesitation that I place this fungus in *Lyophyllum* Karsten. If Kühner had indicated for instance *Calocybe ionides* as the type species of the name *Calocybe*, I would not hesitate to include our plant in the latter genus. However, since *Calocybe georgii* is the type by original designation, and since this vernal mushroom with some forms or/and related species, to my mind, is not very closely related to section *Carneoviolaceae* Sing., I prefer to follow Kühner & Romagnesi (1953), conceiving *Lyophyllum* in a wider sense, at least for the time being. As an additional argument not to use the name *Calocybe*, Dr M. A. Donk draws my attention to the fact that it seems not to have been validly published.

Cystoderma superbum *spec. nov.*—Figs. 1–6

Pileo 20–55 mm lato, convexo, explanato, subtiliter granuloso, vinaceo-purpureo, margine appendiculato; carne pallidiore, odore et sapore subnullo. Lamellis subconfertis, rotundato-adnatis, cremeis vel salmoneis, aciebus erosis. Stipite 35–60 × 4–8 mm, mox tubuloso, initio usque ad zonam annularem filamentosam squamulis granuloso-fibrillosis vestito, glabrescente. Sporis in cumulo albis, non amyloideis, 3.8–4.6 × 2.9–3.3 μ, levibus, ellipsoideis. Basidiis tetrasterigmatibus. Cystidiis nullis. Cellulis cuticulae pilei globosis, pigmento rubro-brunneo incrustatis, KOH ope brunnescentibus. Hyphis fibuligeris. In fasciculis in serragine, probabiliter *Picearum*.



Figs. 1–6. *Cystoderma superbum* Huijsm.: 1—fruit-body 1 ×; 2—section through fruit-body 1×; 3—section through young specimen 2.5 ×; 4—pedicellate globose cell from surface of the pileus 1000 × (most of these cells are completely globose, viz. sphaerocysts); 5—fragment of hypha underlying sphaerocysts 1000 ×; 6—spores 2000 ×.

Figs. 7–8. *Lyophyllum alpestre* (Britz.) Huijsm.: 7—section through fruit-body 1 ×; 8—spores 2000 ×.

Figs. 9–12. *Mycena atrochalybaea* Huijsm.: 9—fruit-body 1 ×; 10—section through fruit-body 1 ×; 11—spores 2000 ×; 12—cheilocystidia 1000 ×.

Fruit-bodies clustered. *Pileus* 20–55 mm. wide, convex, finally expanded and then often with depressed centre, dry and delicately granular, and of a beautiful uniform vinaceous-purple all over (Séguy 36, but slightly more brown), margin appendiculate at first by ruptured veil, long remaining incurved; flesh rather thin, paler than surface of pileus, darkest below surface and just above gills, odour and taste almost lacking. *Gills* somewhat crowded, 40–45, with (2–)3 ranks of lamellules, rotundate-adnate, equal or attenuating in front, up to 6–7 mm. broad, cream to salmon-fleshcoloured, palest at eroded edge. *Stem* 35–60 × 4–8 mm., often compressed or somewhat "fasciate", often curved below, stuffed with a whitish pith at first, soon becoming tubular, base often slightly thickened and minutely white-tomentose, nearly concolorous with pileus, palest below and somewhat bluish purple above, granular-subfibrillose scaly up till a more fibrillose ring-like zone about 10 mm. below apex, glabrescent.

Spores white in the mass, non-amyloid in spore-print and under microscope, 3.8–

4.6 × 2.8–3.3 μ, smooth, ellipsoid, with central gutta. Basidia 17–21 × 5–6 μ, 4-spored. Pleurocystidia and cheilocystidia lacking. Trama of gills subregular, diameter of hyphae 10–18 μ (measured in fresh specimen). Subhymenium narrow, about $^1/_3$ of thickness of hymenium, subcellular. Superficial layer of pileus chiefly consisting of sphaerocysts 20–25 μ in diameter and with membranal as well as incrusting red-brown pigment; underlying layer composed of 6–11 μ wide hyphae with short elements, pigmented like the sphaerocysts and, in addition, with angular, intercellular, red-brown, crystalline particles, up to 8 μ in diameter; pigments much darkening in KOH solution. Clamps present.

Habitat.—In sawdust, probably of *Picea*.

Type.—L 955.240–068.

Switzerland: Canton of Luzern: near Schüpfheim, 8 IX 1955. Mrs *A. W. Huijsman* (*type* L 955. 240–068).

Cystoderma superbum is characterized by its beautiful purple colour, non-amyloid and small spores, darkening of cuticular cells with KOH, and the presence of numerous incrusted sphaerocysts on the surface of the pileus.

It appears near to *C. ponderosum* A. H. Smith & Singer which has a wider pileus of quite a different colour, and is squarrose at the disc. Moreover, true sphaerocysts are practically lacking on the surface of the pileus of *C. ponderosum*.

The name that came to my mind when first studying the fungus was *Cystoderma haematites* (Berk. & Br.) Kühner & Maire. However, the use of Singer's key (1949), led to reject this supposition immediately in view of the non-amyloid spores of the Swiss plant. Since our species appeared to be different from the species treated in Smith & Singer's two papers on *Cystoderma*, it seemed indicated to look upon it as a novelty. Still, since Smith & Singer did not themselves study any specimens of *C. haematites*, there was reason to question their statement of the spores being amyloid in this species. The source they referred to was a treatise, fundamental in many respects, by Kühner & Maire (1934), in which the French authors (l.c. 14) indicated amyloid spores for *C. haematites* Bres. [!]. On the same page Kühner & Maire gave some observations on the genus *Cystoderma* which show their delimitation of some of the species of this genus to be at that time still rather vague, which they frankly admitted. In addition, Bresadola's picture (Pl. 196) in his Fungi tridentini might represent some form of the *C. granulosum-cinnabarinum* complex sensu Smith & Singer which has amyloid spores. If one would assume that Kühner & Maire had some other species in hands instead of the true *C. haematites*, there is still the possibility of the Swiss fungus being identical with the latter. This possibility gained weight by the fact that (i) Cooke's picture of *C. haematites* (Pl. 45) – aside from the lustre of the surface of the pileus which might be imaginary – would appear to represent quite well the species under discussion; (ii) Berkeley's fungus was collected on fir needles (Berkeley & Broome, 18) and the Swiss one on sawdust very probably also of fir, whereas *C. haematites* sensu Bres. was said to have grown "in silvis locis muscosis."

The decisive problem became whether Berkeley's type-specimen of *C. haematites* had amyloid spores or not. If it could be proved to have non-amyloid spores, first, the identity of our plant with *C. haematites* would become highly

probable and, secondly, it would mean that the modern conceptions of *C. haematites* were founded on an error.

In an attempt to solve this question I sent a dried specimen and a description of the Swiss plant to Dr R. W. G. Dennis, asking to compare them with Berkeley's type. The result was rather unexpected in that Dr Dennis informed me that not only the spores of Berkeley's type were non-amyloid, but also that they measured considerably more than those of the Swiss fungus: "the type [of *C. haematites*] is here and has spores 7 – 8 × 4 – 5 μ, perfectly *non*-amyloid to my eyes! . . . the spores I saw are certainly basidiospores and I see no reason to suppose they are alien to the fungus. . . . Massee has annotated the Kew copy of Brit. Fungus Flora Vol. 3, p. 22 'spores 8 × 5 μ in type' and apparently he was right." Dr Dennis kindly included a fragment of a gill, thus enabling me to verify his observations and, more in particular, to notice the lack of any trace of amyloidity of the spores in chloral hydrate after a prolonged treatment with Melzer's liquid, observed in day-light. Finally, I had the good fortune of finding a basidium with four well-developed sterigmata, which proves that Berkeley's type does not at least represent a two-spored form with "macrospores" of a fungus normally four-spored.

Summarizing it may be concluded that (i) the Swiss *Cystoderma* with its small spores (3.8 – 4.6 × 2.9 – 3.3 μ) can not be identical with "*Cystoderma*" *haematites* and, as it is also not identical with any other species of the same genus, it must be regarded as undescribed; (ii) all modern descriptions of *C. haematites* are based directly (Konrad & Maublanc) or indirectly (with as an ultimate source the measurements of Bresadola in his "Fungi tridentini", 4 × 3 μ) on collections with small or/and amyloid spores and, therefore, do not coincide with *Armillaria haematites* Berk. & Br.; (iii) *Armillaria haematites* Berk & Br., of which the original description is rather brief and difficult to interpret, is as yet a doubtful species, the type of which has to be restudied in detail.

Mycena atrochalybaea *spec. nov.*—Figs. 9–12

Pileo 15–40 mm lato, hemispherico vel obtuse umbonato, obscure fuligineo-brunneo, subhygrophano; carne grisea, inodora. Lamellis rotundato- vel emarginato-adnatis, griseis. Stipite 35–60 × 2.5–4 mm, subcartilagineo, fuligineo, splendore chalybaeo valde notabile. Sporis 7–9 × 4.5–5.5 μ, ellipsoideis, amyloideis. Basidiis tetrasterigmatibus. Cheilocystidiis numerosis, 17–25 × 8–12 μ, clavatis, setuloso-verrucosis. In fasciculis ad truncos in picetis.

Fruit-bodies fasciculate (8–12 individuals). *Pileus* 15–40 mm. wide, hemispheric, often with broad and obtuse umbo, becoming conical or even flat, not viscid, smooth, slightly hygrophanous, when moist translucently striate half-way up and dark fuliginous-brown, when dry not considerably paler and slightly wrinkled; flesh rather thin, greyish, darkest under cuticle and above gills, odour and taste not distinctive. *Gills* not crowded, 30–40, with (1–)2 orders of lamellules, rather thick, intervenose, rotundate- to emarginate-adnate, ventricose, 4–5 mm. broad, grey, palest at edge. *Stem* 35–60 × 2.5–4 mm., firm, collybioid, somewhat lanate-mycelioid at base, inside and outside almost concolorous with surface of pileus, palest above, lustrous with conspicuous steel-blue reflections.

Spores white in the mass, amyloid, 7–9 × 4.5–5.5 μ, smooth, ellipsoid. Basidia 24–30 × 6–7.5 μ, 4-spored, subclavate, with clamps at base. Cheilocystidia abundant, 17–25 × 8–12 μ, clavate, with numerous short rod-like processes, pleurocystidia lacking. Trama of gills and pileus (epicutis excepted) vinaceous-brown in iodine solution.

Hyphae of epicutis radially arranged, 2–4 μ in diameter, only the outermost ones with subgelatinized walls and with scattered diverticles. Elements of hypoderm 20–25–35 μ wide, diffusely darker than hyphae of adjacent tissues.

HABITAT.—On trunks of *Picea*.

TYPE.—L 955.240–106.

SWITZERLAND: Canton of Luzern: near Schüpfheim, 25 IX 1953, *H. S. C. Huijsman* (L 955.097–023); Goberwald near Romoos, 28 IX 1953, Mrs *A. W. Huijsman* (L 955.097–030); near Sörenberg, alt. 1400 m., 9 IX 1955, *J. van Brummelen* (L 955.239–438); Goberwald, 12 IX 1955, Mrs *A. W. Huijsman* (*type*, L 955.240–106).

This dark-coloured *Mycena* with its granulate cystidia is readily recognized by the beautiful steel-blue reflections of the stem.

Failing to locate any description of this rather conspicuous fungus, which would seem to be not uncommon in the Canton of Luzern, I presented my data to the eminent Swiss specialist Dr J. Favre who kindly informed me that he had presumably overlooked the species and that he, too, did not succeed in finding a name for it in literature. "... en réalité votre *Mycena* est un peu le pendant, chez les *Rigidipedes*, de *M. atrocyanea* chez les *Fuscescentes*. C'est peut-être bien pourquoi votre espèce m'a échappé. J'ai observé assez souvent cet *atrocyanea*, ou du moins ce que j'ai cru tel, mais je n'ai pas toujours pris soin de le passer sous le microscope, de sorte que j'ai peut-être eu votre champignon dans les mains."

Our species seems to be closely related to *M. hemisphaerica* Peck as treated by A. H. Smith (1947), which, according to Smith, is *M. parabolica* sensu Lange, but the differences are by no means slight. In *M. hemisphaerica* the stipe is much more slender and "fuscous" to "stormgray" (Ridgway), the pileus is considerably paler when old and has a subgelatinous pellicle (the term "subgelatinous" refers to the microscopical aspect here), and the projections of the cystidia are more elongated to digitiform. Besides, Lange's picture of *M. parabolica* (Pl. 56D) does not at all resemble *M. atrochalybaea*.

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THE STIPITATE HYDNUMS OF THE NETHERLANDS—I

Sarcodon P. Karst.

R. A. Maas Geesteranus
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(With 1 Text-figure)

A revision of the genus *Sarcodon* is given. Some species not yet found in The Netherlands are also included. Attention is drawn to *Hydnum badium* sensu Lundell and *Sarcodon laevigatus* sensu Bourdot & Galzin which seem to have no correct name. The following names are reduced to synonymy: *Hydnum badium* Pers., *Hydnum versipelle* Fr., and *Sarcodon inopinatus* Donk. *Hydnum subsquamosum* Batsch ex Fr. is rejected as a nomen dubium. The new combination *Sarcodon bubalinus* (Pers.) Maas G. is proposed.

In the present paper which is primarily concerned with the indigenous species, I have also treated such species as may be expected to be found in The Netherlands, or which are of a more general interest. *Sarcodon* is here conceived exactly in the same way as in Coker & Beers's monograph, that is with the exclusion of the genus *Bankera*.

Rather than repeating previous authors in giving detailed descriptions, stress is laid upon the discussion.

Descriptions have been made after indigenous material, if not stated to the contrary. However, both material and descriptions were compared with collections from various European countries. For a clear understanding of the species as many illustrations as have been accessible to me are enumerated and annotated. Of the exsiccati series only the sets examined by me are given. Unfortunately, a loan from the Kew Herbarium, containing several exsiccati, was returned much too soon, i.e. before it was realised that notes ought to have been made.

In preparing the key and the descriptions, macroscopic measurements and microscopic details have largely been left out, which in Hydnums are of less importance to the species-concept. On the other hand, due attention has been given to the presence or absence of clamp connections. When boiled for a few moments in a fairly strong solution of KOH, even the trama of old and badly dried specimens will revive sufficiently well for the demonstration of clamps to be successful.

Acknowledgments.—For the revision of the Dutch stipitate Hydnums I have had the co-operation of several Herbaria without which this work could not have been completed. Loans were received from: the Botanical Department of the National Museum, Prague (rich Czechoslovakian collections, and Lundell & Nannfeldt, Fungi exs.); British Museum, Natural History, London (Swedish specimens collected by Dr A. Melderis); Kgl. Veterinaer- og Landbohøjskole, Plantepatologisk Afdeling, Copenhagen (Danish material); Muséum National d'Histoire Naturelle, Laboratoire de Cryptogamie, Paris (Herb. Bourdot); Naturhistoriska Riksmuseet, Botaniska Avdelningen, Stockholm (Swedish material and specimens from Herb. Bresadola); New York Botanical Garden, New York (type of *Hydnellum diabolus* Banker); New York State Museum and

Science Service, Albany (portions of the two syntypes of *Hydnum spongiosipes* Peck, and type of *Hydnum albonigrum* Peck); Royal Botanic Gardens, The Herbarium, Kew (British collections, and type of *Hydnum Vespertilio* Berk.); Universitetets Botaniske Museum, Copenhagen (Danish material, and Lundell & Nannfeldt, Fungi exs.); Universitetets Botaniska Museum, Uppsala (Swedish material). To the Directors and Keepers of these Herbaria I wish to express my deep gratitude.

I also acknowledge with pleasure the valuable collection of Czechoslovakian Hydnums received in exchange from Dr F. Kotlaba of the Botanical Institute of the Charles University, Prague.

To Dr M. A. Donk, Leiden, I am under obligation for readily placing his herbarium at my disposal, as well as for his continued interest and helpful criticism.

Dr S. Lundell, Uppsala, who took great care in selecting the best material to suit my purpose, gave me invaluable advice for which I am thankful indeed.

It is impossible to mention the many individuals to whom I am indebted for the way they furthered my studies by sending fresh specimens.

Sarcodon P. Karst.

Sarcodon P. Karst. *in* Rev. mycol. **3** (No. 9): 20. 1881 & *in* Medd. Soc. Faun. Fl. fenn. **6**: 16. 1881. — Type species: *Hydnum imbricatum* L. ex Fr., see Donk (1956: 111).

Carpophore terrestrial, stipitate, fleshy. Pileus covered with tomentum collapsing into a pellicle or, in some cases, probably with a pellicle from the beginning. Trama not zonate, homogeneous, i.e. not of duplex structure. Hymenium covering spines on underside of pileus. Spines becoming brown with maturity. Basidia tetrasporous. Spores subglobose to angular, roughly tuberculate, brown in the mass. Odour not of fenugreek.

In the present genus the colour of the flesh, and the presence or absence of clamp connections in the tramal hyphae have proved to be the most convenient means of provisionally classifying the species. As far as the European species are concerned, they readily fall into four groups. Group 1 is characterised by the vivid vinaceous colour of the trama and the lack of clamps. *Sarcodon commutatus* belongs here, and probably also a species not treated in this paper, viz. *S. catalaunicus* R. Maire. *Hydnum fuligineo-violaceum* Kalchbr. which was long thought to be a *Sarcodon* would seem another species of this group, but a recent re-description by Nikolajeva (1953: 147), again as *Sarcodon*, giving the colour of the spines as "violet, then pinkish grey-brown" and the spores as "... sparingly and finely warted," rather suggests that the species is a true *Bankera*. The three remaining groups agree in that in the pileus and the adjacent portion of the stipe the trama is whitish to pale brownish at the most. The subsequent reddish or vinaceous discolouring which may occur on exposure in some species is only faint as compared with the strong colour of the flesh of group 1. Group 2 and 3 have in common that the trama in the base of the stipe is concolorous with that in the pileus or nearly so. The difference is that in group 2 the hyphae lack clamp connections, whereas those of group 3 have numerous clamps. Group 4, finally, is characterised by (1) the trama in the base of the stipe being grey-green, blackish green to blackish, and (2) the hyphae lacking clamp connections.

Fig. 1. Distribution of *Sarcodon* in The Netherlands. Hatched areas: sandy soils. Horizontally hatched: dunal region. Obliquely hatched: inland dunes and acid sands of diluvial origin.

● *S. commutatus*, material seen;
○ the same, from reliable records;
■ *S. fennicus*;
▲ *S. imbricatus*, material seen;
△ the same, from reliable records;
× *S. scabrosus*.

KEY TO THE SPECIES

1a. Trama of pileus vinaceous, violaceous in stipe, never white at first; tramal hyphae without clamps, **group 1** . . . . . *S. commutatus*, p. 50
1b. Trama whitish or faintly sepia, in some cases becoming suffused with reddish or vinaceous on exposure 2
2a. Trama in base of stipe concolorous with trama in pileus or somewhat darker . . . 3
3a. Tramal hyphae without clamps, **group 2** 4
4a. Pileus purplish brown, pellicle becoming ruptured into areoles or innate squamules . . . . . *S. bubalinus*, p. 48
4b. Pileus yellow-brown with darker brown free scales . . . . . *Hydnum badium* sensu Lundell, p. 56
3b. Tramal hyphae with clamps, **group 3** 5
5a. Pileus glabrous and smooth, or if pellicle cracked into scales, the latter adnate 6
6a. Trama becoming suffused with vinaceous, odour nauseating, taste becoming bitter . . . . . *S. laevigatus* sensu Bourd. & Galz., p. 57
6b. Trama remaining white, odour and taste indifferent *S. laevigatus*, p. 56
5b. Pileus coarsely squamose, with the central scales erect or having the tips upturned . . . . . *S. imbricatus*, p. 53
2b. Trama in base of stipe greyish green, blackish green to blackish; tramal hyphae without clamps, **group 4** 7

7a. Pileus velvety, tomentum collapsing into a glabrous pellicle or rupturing into minute squamules, trama becoming flushed with a vinaceous hue, green in KOH . . . . . *S. amarescens*, p. 47

7b. Pileus soon becoming scaly, scales coarse at least in centre of pileus 8

8a. General impression of fruit-body: fairly pale species. Pileus yellow-brown or with rufous tinge (more rarely somewhat vinaceous), trama white or tinged with bistre in stipe, not discolouring with KOH, stem usually slender . . . . . *S. fennicus*, p. 52

8b. General impression of fruit-body: dark species. Pileus purplish brown to paler or darker fuscous with vinaceous hue, trama whitish, sooner or later becoming suffused with reddish or vinaceous tint, blue-green in KOH, stem usually stocky . . . . . *S. scabrosus*, p. 58

Sarcodon amarescens (Quél.) Quél.

Sarcodon amarescens (Quél.) Quél. *in* C. R. Assoc. franç. Avanc. Sci. **11**: 13. 1882. — *Hydnum* **amarescens* Quél. *in* Bull. Soc. Amis Sci. nat. Rouen ser. 2, **15**: 172 (1879) 1880. — Type: non-existing, according to information Prof. A. Maublanc. — Type locality: France, Montmorency ("Dans les bruyères et bois arénacés").

Descriptions.—Bourdot & Galzin, Hym. France. 450. 1928; Coker & Beers, Stip. Hydn. east. U.S. 37. 1951; Konrad & Maublanc, Icon. sel. Fung. **5**: text to pl. 467. 1925–1935.

Illustrations.—Coker *in* J. Mitchell sci. Soc. **41**: pl. 53. 1926 (*Hydnum*, photogr.); Coker & Beers, Stip. Hydn. east. U.S. pl. 22. 1951 (photogr.); Konrad & Maublanc, Icon. sel. Fung. **5**: pl. 467. 1925–1935 (stem and trama rather pale, otherwise good); Patouillard, Tab. anal. Fung. **2**: fig. 145. 1883 (*Hydnum*, probably some other species depicted?: base of stem lacks green colour); Quélet *in* C. R. Assoc. franç. Avanc. Sci. **11**: pl. 11, fig. 14. 1882 (good).

Diagnostic characters.—Pileus velvety to strigose-pubescent, tomentum finally collapsing into glabrous pellicle, dingy flesh-coloured lilac, later on turning yellowish brown, avellaneous to fulvous. Stipe tapering downwards and somewhat rooting, finely felted, glabrescent, same colour as pileus but paler, with flesh-coloured or some vinaceous tints, greyish green at base. Spines decurrent, finally chocolate brown. Trama white to dingy white, soon becoming flushed with vinaceous, especially further down the stipe, greyish green to blackish green in base, blue-green in KOH. Odour of peach kernel (Konr. & Maubl.), "mildly aromatic, somewhat like fenugreek"[!] (Coker & Beers). Taste peppery, then extremely bitter (Bourd. & Galz.), peppery, then very bitter (Konr. & Maubl.), acrid and astringent (Coker & Beers). Tramal hyphae without clamps. (Described after the authentic specimens and data furnished by the authors cited above.)

Habitat.—The species in Europe is said to occur in heaths and sandy coniferous woods.

Authentic material.—Nice, leg. Barla (PC).

Exsiccati.—None distributed as far as known.

Bourdot & Galzin as well as Konrad & Maublanc describe the surface of the pileus as "velouté," but Quélet's words "Chapeau ... glabrescent, puis rayé-aréolé" (l.c. 172) indicate that his specimens were not altogether devoid of a certain scalyness. To my mind, therefore, Coker & Beers were correct in referring their specimens to the present species even if they found the pileus to be "minutely squamulose." In one of the authentic specimens which Quélet

had received from Barla (and which, unfortunately, are in rather poor condition), the pileus shows a perfectly glabrous pellicle, whereas in the other specimen the pileus is finely velutinous, but both seem to be juvenile. In this connection it should also be remembered that even the surface of *S. laevigatus*, originally described by Swartz as "glaberrimo," may with age become distinctly adnato-squamulose.

Sarcodon amarescens and *S. scabrosus* are closely related species, and their distinction may cause some trouble. The former is on the whole a fairly pale species with its pileus never attaining the dark, purplish brown colour of the latter. The squamules of the pileus in *S. amarescens*, if there are any, are minute indeed as compared to the coarse scales of *S. scabrosus*. Whereas the base of the stipe is attenuate in the former, it is not so in the latter.

Although Donk (1933: 59) doubtfully mentioned the species in his key, *Sarcodon amarescens* has never been recorded from this country, but its occurrence may be expected.

Sarcodon bubalinus (Pers.) Maas G. *comb. nov.*

Hydnum bubalinum Pers., Mycol. europ. **2**: 161. 1825. — Type: *Hydnum bubalinum*, misit Chaillet (L 910.262–24).

Hydnum versipelle Fr. *in* Öfvers. kgl. VetAkad. Förh. **18**: 31. 1861. — Type: non-existing. — Type locality: Sweden, Uppsala.

DESCRIPTIONS.—Fries, Monogr. Hym. suec. **2**: 274. 1863 & Icon. sel. Hym. **1**: 4. 1867 (*Hydnum versipelle*).

ILLUSTRATIONS.—Bresadola, Icon. mycol. **21**: pl. 1040. 1932 (*H. versipelle*, clustered form, colour misleading); Fries, Icon. sel. Hym. **1**: pl. 1. 1867 (*H. versipelle*, clustered form, probably somewhat too pale).

DIAGNOSTIC CHARACTERS.—Fruit-bodies usually solitary, rarely clustered. Pileus smooth and glabrous, or surface (with age?) from centre outwards becoming ruptured into areoles or innate, fibrillose-membranous scales, purplish brown with the scales darker, sepia tinted with vinaceous. Stipe fairly slender to stocky, equal, glabrous to somewhat fibrillose, pale yellow-brown becoming almost concolorous with pileus but paler, more or less covered with tomentum at base (greyish when fresh?). Spines decurrent, finally chocolate brown. Trama whitish, but stated by Fries to be paler than pileus (1867: 4), not discolouring with KOH. Odour and taste unknown to me. Tramal hyphae without clamps. (Described after the type specimen and Swedish collections of *Hydnum versipelle*.)

HABITAT.—Reported to grow in pine woods.

EXSICCATI.—None distributed.

Fries (1828: 130 and 1874: 599) took Persoon's *Hydnum bubalinum* to be a synonym of his *Hydnum laevigatum*. Banker (1913: 14) who examined the type specimen of *H. bubalinum* held the same opinion. However, as I could ascertain from Persoon's material, this is an error.

Briefly, the specimen of *Hydnum bubalinum* is medium-sized, with fairly dark purplish brown pileus, showing traces of innate squamules, stocky concolorous stipe (almost completely destroyed by beetles, but still visibly enlarged below with short, pointed base), chocolate brown spines, and a trama

(also badly damaged) which is pale yellow-brown in pileus, brown in base of stipe. The squamules must have been innate in the living condition as well, much in the manner of the squamules of *S. laevigatus*, otherwise Persoon could not have described the pileus as "glabro laevissimo."

The fleshy homogeneous trama, and the brown and roughly tuberculate spores make it clear that the specimen is a true *Sarcodon*. Unfortunately, Persoon omitted to describe the colour of the flesh, but I take it to have originally been whitish. This leaves out *S. commutatus* which retains the purple colour of the trama when well-dried, or becomes very dark when badly dried. From the lack of clamp connections in Persoon's specimen it is equally obvious that it cannot be referred to group 3 which is characterised by (1) whitish trama not passing into grey-green in the base of the stipe, and (2) clamped hyphae. Group 4, agreeing with *H. bubalinum* in the lack of clamp connections, may be ruled out on account of the colour of the base of the stipe which is grey-green to blackish within and without. The last group to be considered is exemplified by *Hydnum badium* in the sense of Lundell, and characterised by (1) whitish trama which is not grey-green in the base of the stipe, and (2) tramal hyphae without clamp connections. From the notes on the type given above it may be derived that *Hydnum bubalinum* also belongs to this group. It differs from *H. badium* sensu Lundell in the purplish hue of the pileus and the innate squamules.

The picture that can be drawn of *Hydnum versipelle* from Fries's descriptions and plate, as well as from recently collected material regarded by Lundell as typical of this species, leads to the conclusion that (1) it belongs to the group of *H. bubalinum*, (2) it is essentially identical with that species. The type specimen of *H. bubalinum* is darker than the collections of *H. versipelle* which Dr Lundell had kindly sent for comparison, but allowing for the perfect technique of drying of the Swedish material, this difference – the only difference I can find – may be set aside.

On comparing *Hydnum bubalinum* with the descriptions of the North American Sarcodons, it would appear that it is not referable to any of the species treated by Coker & Beers.

It may be questioned whether *Hydnum subsquamosum* Batsch ex Fr. (Syst. mycol. 1: 399. 1821) should be chosen as basinym for the correct name of the present species. Lundell (1947: 47) once thought *H. subsquamosum* to be a solitarily growing form of which in later years the clustered form was described as *H. versipelle*. If it could be proved beyond doubt that the two epithets refer to the same species, '*subsquamosum*' would have priority over '*bubalinum*.' As it is, however, I have come to a different opinion. It is unknown what Fries understood by his *H. subsquamosum*. No authentic material of this name is available. Fries added "(v.v.)" to his description in the Systema, from which may be gathered that he referred his material to the species as described by Batsch, without having seen the authentic specimen. However, from the description and plate supplied by Batsch (1783: 111, pl. 10, fig. 43) it is impossible to identify the species. It might represent *Hydnum badium* in the sense of Lundell as far as the colour is concerned, but the words "maculis applanatis" do not fit for that species, and on the whole it seems unwarranted to decide on the identity on the basis of too slight data. Batsch also referred to Schaeffer's

Plate 140 as typical of his *H. subsquamosum*, and part of his description is actually based on that plate, but except for dubious figure 1 all specimens depicted by Schaeffer represent *Sarcodon imbricatus*.

As further illustrations representing his species, Fries (1821: 399) cited Bulliard's Plate 409, and afterwards (1867: 4) Persoon's Plate 21 in Mycologia europaea. The former clearly is no *Sarcodon* but a *Hydnellum* instead (on account of the zonate flesh, and the tomentum of the stipe imbedding vegetable debris), whereas the latter, as I have shown elsewhere, depicts *Sarcodon imbricatus*. The above facts will serve to show that *H. subsquamosum*, being a nomen dubium, is untenable.

Returning to Fries's description of *H. subsquamosum*, it is of importance to note that one of its main parts is composed of two discordant elements. "Caro cinereo-alba" refers to the trama of a *Sarcodon*, whereas "zona una alterave tenuissima variegata" is characteristic of the genus *Hydnellum*. This ground alone justifies the species to be rejected according to Art. 76.

Sarcodon bubalinus is as yet unknown from this country.

SARCODON COMMUTATUS Bourd. & Galz.

Sarcodon commutatus Bourd. & Galz. *in* Bull. Soc. mycol. France **40**: 109. 1924 ("*S. commutatum*"). — *Sarcodon ionides* subsp. *commutatum* Bourd. & Galz., Hym. France 451. 1928. — *Hydnum commutatum* (Bourd. & Galz.) Pouz. *in* Česká Mykol. **10**: 67. 1956. — Type: Champignons de l'Aveyron, *Sarcodon commutatum*, sur humus, sous des Châtaigniers, Evès; leg. Galzin, no. 20559, IX 1916 (Herb. H. Bourdot, no. 18304; PC).

Sarcodon inopinatus Donk *in* Med. Nederl. mycol. Ver. **22**: 62. 1933. — *Hydnum inopinatum* (Donk) Van der Lek *in* Cool & Van der Lek, Paddestoelenboek. Derde druk **2**: 206. 1935 & Vierde druk **2**: 221. 1943; Pouz. *in* Česká Mykol. **10**: 67. 1956. — Type: *Sarcodon inopinatus*, Netherlands, Overijsel, Delden, det. leg. M. A. Donk, no. 1698, in a mixed wood, IX 1929 (Herb. Donk).

DESCRIPTIONS.—Bourdot & Galzin, Hym. France 451. 1928; Donk *in* Med. Nederl. mycol. Ver. **22**: 62. 1933 (*S. inopinatus*).

ILLUSTRATION.—Fl. batava **25**: pl. 1980a. 1920 (*H. violaceum*, hardly recognisable, see remarks).

DIAGNOSTIC CHARACTERS.—Pileus originally finely felted, glabrescent from collapse of tomentum, or pellicle rupturing into scales which are either appressed or have the tips upturned, café au lait or flesh-coloured pinkish brown, sometimes faintly suffused with lilac, later on with fulvous to dark bay scales on ochraceous brown ground colour. Stipe tapering downwards, finely felted, becoming glabrous, concolorous with pileus, covered with whitish felt at base, more rarely somewhat blackened. Spines decurrent, finally chocolate brown. Trama pinkish lilac to vinaceous in pileus, more violet above spines, violet to purplish violet further down in stipe, sometimes streaked with brown, discolouring blue-green with KOH. Odour faint, pleasant, when cut farinaceous or of French beans. Taste tardily bitter (Bourd.& Galz., Donk), or somewhat acrid, later on disagreeable in the throat, not actually bitter. Tramal hyphae without clamps.

HABITAT.—On acid humous sandy soil, usually in woods of *Quercus* and *Betula*, but also in frondose woods mixed with *Pinus*.

DISTRIBUTION.—Not uncommon in the central and eastern parts of the country.

ILLUSTRATIVE COLLECTIONS.—Friesland: Olterterp, 18 IX 1955, *Mrs E. Kijlstra* (L); Gelderland: Wageningen (Hoog), 24 VIII 1952, *Maas G.* 8970 (L).

EXSICCATI.—None distributed.

Comparing the original descriptions of *S. commutatus* and *S. inopinatus*, it appears that there are only a few discrepancies which in my opinion are of minor importance, and rather seem to be due to slight geographical differences. The pileus was described as convex by Bourdot & Galzin, "later on flattened and somewhat depressed in the centre" by Donk. Actually, two of the specimens of the type material of *S. commutatus*, although badly broken, have the pileus depressed in the centre. The waviness of the margin and the variable length of the stipe, mentioned by Donk, are characters omitted by Bourdot & Galzin, presumably since these were considered of no great consequence. The omission in Bourdot & Galzin's description of a note on the odour which Donk gives as "faint, agreeable" is unfortunate, but the agreement of all other characters of the trama excludes any doubt. Whereas Bourdot & Galzin described the hyphae as "flasques," not mentioned by Donk, it should be remembered that this quality is typical of the genus. In enumerating the differences between both species, Donk states *S. inopinatus* to be "bedeutend kräftiger" with an appreciably larger diameter of the pileus, but that statement is mainly attributable to an error. In reality, Bourdot & Galzin give the size of the pileus of *S. commutatus* as 3–5 cm., not 2–4 cm. as quoted by Donk, but even if that would have been the case, I have come to regard sizes in Hydnums as of limited significance, especially so if geographically different specimens are considered.

In enumerating the fungi of "la Manche" Corbière (1929: 225) supplied a description of *S. commutatus* which could very well have been made after our indigenous material. The taste is stated to be "non amère," exactly as I find it. What makes Corbière's description most interesting is that specimens had been submitted to Bourdot who apparently approved of the identification.

Coming to the type material itself, it is unfortunate that Donk's specimens have lost most of their characters, including the colour of the trama, presumably on account of too slow a process of drying. The material of *S. commutatus*, on the other hand, may favourably be compared with the smaller specimens of our recent, well-dried Dutch collections. The type specimens of both *S. commutatus* and *S. inopinatus* agree in that the pilei in places still show some of the original felt which neither Bourdot & Galzin nor Donk described. Altogether, I have no doubt whatever that *Sarcodon inopinatus*, as exemplified by our recent collections which perfectly answer Donk's description, is synonymous with *Sarcodon commutatus*.

It is not at all impossible that *Hydnum joeides* as described by Passerini (1872: 157), subsequently called *H. jonides* by Saccardo (1912: 365) and *S. ionides* by Bourdot & Galzin, should turn out to be an earlier epithet for the present species. On the other hand, it is worth noticing that Saccardo supplemented Passerini's description with a note on the spores: "Sporis globosis, breve tenuiter spinulosis, . . . hyalinis," which would suggest that *Hydnum joeides* is a *Bankera*. It is hard to come to a decision in this matter without having seen Passerini's material which I failed to trace. It is neither in the Herbarium of Florence, nor in the Botanical Institutes at Parma or Pisa.

Maire (1937: 34) described a *Sarcodon catalaunicus* which he stated to differ from *S. inopinatus* in "ses teintes plus claires, sa petite taille, son pied atténué à la base, sa chair non ou à peine âcre à la langue, mais âcre à la gorge comme

celle du *Clitocybe mellea*, à odeur de farine." Rather more than the preceding characters, to my mind the colours of the flesh and the spines, described as "umbrino-purpuraceus" and "umbrino-violaceus" respectively, would make it plausible that both species, although closely related, are distinct.

To me it is far from certain whether the plate in Flora batava, quoted by Donk, really represents our species, as the figures do not correspond to the accompanying description, whereas the beautiful colours of the trama, the most striking feature of *S. commutatus*, are replaced in the plate by a drab grey. Moreover, one would hardly describe a fungus with acrid or bitterish flesh as "mangeable."

A character worth noticing, because it is rarely found in the genus *Sarcodon*, is the occurrence on the pileus of excretions which, as in *Hydnellum*, quickly dissolve in KOH.

SARCODON FENNICUS (P. Karst.) P. Karst

Sarcodon fennicus (P. Karst.) P. Karst. *in* Rev. mycol. **9**: 10. 1887. — *Sarcodon scabrosus* var. *fennicus* P. Karst. *in* Bidr. känn. Finl. Nat. Folk **37**: 104. 1882.—Type: not seen. — Type locality: Finland, Mustiala.

DESCRIPTIONS.—Coker & Beers, Stip. Hydn. east. U.S. 43. 1951; Karsten *in* Rev. mycol. **9**: 10. 1887.

ILLUSTRATIONS.—Beardslee *in* Mycologia **16**: pl. 20, fig. 3. 1924 (photogr., uncertain); Coker & Beers, Stip. Hydn. east. U.S. pl. 25 (bottom). 1951 (photogr.); Karsten, Icon. sel. Hym. fenn. **3**: pl. 11, fig. 59. 1889 (fairly good); Krieger, Popul. Guide higher Fungi N.Y. State, pl. 19 (top). 1935 (*Hydnum*, not this species, see remarks); Nikolajeva *in* Not. syst. Sect. cryptog. Inst. bot. Komarovii Acad. Sci. URSS **9**: fig. 1. 1953 (passable).

DIAGNOSTIC CHARACTERS.—Pileus at first woolly-felted or woolly-strigose, tomentum collapsing into squamose pellicle, scales coarse, imbricate and upturned at tips in centre of pileus, finer and more appressed further outwards, yellow-brown to rufous yellow-brown on concolorous but paler ground colour, occasionally with slight vinaceous tint. Stipe usually slender, tapering downwards, finely felted or with scattered fibrils, glabrescent, concolorous with pileus, blackish olive to bluish black at base. Spines decurrent, finally chocolate brown. Trama whitish, somewhat bistre in stipe, greenish or bluish in base, not discolouring in KOH. Odour sweetish, pleasant, also described as of bitter almonds according to label of Swedish specimen (Bohuslän: Uddevalla, 25 IX 1944, *Israelson*, det. Lundell; UPS). Taste very bitter. Tramal hyphae without clamps. (Described after dried Swedish and Dutch material.)

HABITAT.—On acid sandy soil in mixed or coniferous woods.

DISTRIBUTION.—Presumably rare in this country.

ILLUSTRATIVE COLLECTION.—Drente: Dwingelo, IX 1952, *H. S. C. Huijsman* (only collection; L).

EXSICCATI.—None distributed.

The present species has often been incorrectly interpreted.

Judging from the description by Banker (1906: 147) who gives the colour of the pileus as "dark brown to reddish brown," this author must have had some other species in hands.

Bourdot & Galzin (1928: 450) describe the flesh as white, faintly tinted with

bistre, but continue with the remark that once in a while it also exhibits a slight blue or red discolouration!

Donk (1933: 61) has the flesh in the pileus "zuweilen blass rosa getönt." From Donk's description and a re-examination of the material cited by him it is apparent that *S. fennicus* and *S. scabrosus* were confused.

Very probably also these two species were confused in Krieger's description. His plate does not represent *S. fennicus*, and one would rather think of *S. scabrosus* as far as the general habit is concerned, but the colour is much too pale for that species.

Although I had the opportunity to study excellent collections of the present species from the Stockholm Herbarium, I am still uncertain about the colour of the pileus. From a water-colour drawing added to a specimen in Herb. Romell (Upland: par. Bro, Säbyholm, 18 IX 1922, *E. Ingelström*, det. Lundell; S) it appears, first, that the colour of the pileus has not changed on drying, secondly, that in the living state there was no trace of lilaceous or vinaceous tints in the pileus, nor of a reddish hue of the flesh. Yet, our one indigenous collection has the scales faintly tinted with vinaceous, and the same is described by Coker & Beers ("at times with a tint of vinaceous . . ."), as well as by Nikolajeva (1953: 146, "finally with some lilaceous or pinkish tint").

SARCODON IMBRICATUS (L. ex Fr.) P. Karst.

Sarcodon imbricatus (L. ex Fr.) P. Karst. *in* Rev. mycol. **3** (No. 9): 20. 1881 & *in* Medd. Soc. Faun. Fl. fenn. **6**: 16. 1881. — *Hydnum imbricatum* L., Spec. Pl. **2**: 1178. 1753; ex Fr., Syst. mycol. **1**: 398. 1821. — Type locality: Sweden, Lapland, "In sylvis densissimis occurrit" (L., Fl. lappon. 368. 1737).

Hydnum badium Pers., Mycol. europ. **2**: 155. 1825. — *Sarcodon badius* (Pers.) Donk *in* Med. Nederl. mycol. Ver. **22**: 60. 1933. — Type: *Hydnum badium* Pers., Prope Bruyeres in Vogesia, misit Mougeot (L 910.256–1550, lectotype).

Hydnum cervinum Pers., Mycol. europ. **2**: 158. 1825. — Type: non-existing. — Type locality: Germany, Harz, "In pinetis inprimis hercynicis non infrequens provenit . . ." (Pers., Obs. mycol. **1**: 74. 1796).

DESCRIPTIONS.—Bourdot & Galzin, Hym. France. 448. 1928; Coker & Beers, Stip. Hydn. east. U.S. 47. 1951; Donk *in* Med. Nederl. mycol. Ver. **22**: 59. 1933.

ILLUSTRATIONS. –Barla, Champ. Prov. Nice, pl. 38, fig. 1–4. 1859 (*Hydnum*, good); Beardslee *in* Mycologia **16**: pl. 20, fig. 1–2. 1924 (photogr., good); Bresadola, Icon. mycol. **21**: pl. 1035. 1932 (*Hydnum*, good) & **21**: 1038. 1932 (*Hydnum badium*, good); Coker & Beers. Stip. Hydn. east. U.S. pl. 28–29. 1951 (photogr., pl. 28 uncertain, scales unusually small); Cool & Van der Lek, Paddestoelenboek. Vierde druk, **2**: fig. 87. 1943 (Geschubde stekelzwam, photogr.); Fl. batava **19**: pl. 1464. 1893 (*Hydnum subsquamosum*, somewhat uncertain) & **23**: pl. 1825. 1911 (*Hydnum*, passable); Fries, Sverig. ätl. gift. Svamp. pl. 33. 1860 (*Hydnum*, mediocre); Gillet, Champ. France, pl. 320. 1878–1890 (*Hydnum*, weathered specimen); Gramberg, Pilze Heimat **2**: pl. 30. 1913 (*Hydnum*, rather pale); Greville, Scot. cryptog. Fl. **2**: pl. 71. 1824 (*Hydnum*, good); Haas & Gossner, Pilze Mitteleurop. Speisepilze **1**: no. 34. 1951 (unusually pale); Harzer, Naturgetr. Abb. essb. gift. verdächt. Pilze, pl. 3b. 1842 (*Hydnum*, good); Jaccottet & Robert, Champ. dans la Nature. ed. 4, pl. 65. 1948 (*Hydnum*, very good); Juillard-Hartmann, Icon. Champ. sup. **5**: pl. 202, fig. 1. 1919? (*Hydnum*, passable); Krombholz, Naturgetr. Abb. Beschr. essb. Schw. **7**: pl. 49. 1841

(*Hydnum*, very good); Lenz, Abb. nützl. schädl. Schw. pl. 12, fig. 50. 1831 (*Hydnum*, good); Leuba, Champ. comest. pl. 37, fig. 5. 1890 (*Hydnum*, specimen at the right too reddish, otherwise good); Maublanc, Champ. France. ed. 4, 2: pl. 194. 1952 (good); Michael-Schulz, Führer Pilzfr. 1: pl. 99. 1927 (*Hydnum*, passable); Nannfeldt & Du Rietz, Vilda Växter i Norden. Andra revider. och komplett. upplagan, pl. 122. 1952 (*Hydnum*, photogr., good); Patouillard, Tab. anal. Fung. 3: fig. 245. 1884 (*Hydnum*, spines too pale); Persoon, Mycol. europ. 2: pl. 21. 1825 (*Hydnum badium*, passable); Richon & Roze, Atl. Champ. pl. 65, fig. 8–10. 1888 (*Hydnum*, passable); Rolland, Atl. Champ. France, pl. 99, fig. 217. 1910 (*Hydnum*, good); Schaeffer, Fung. Icon. 2: pl. 140. 1763 (*Hydnum*, fig. 1 uncertain); Sowerby, Col. Fig. Engl. Fungi 1: pl. 73. 1797 (*Hydnum*, passable); Thijsse, Paddenstoelen, pl. 62. 1929 (*Hydnum*, good); Trog, Schw. des Waldes pl. 10, fig. 1–2. 1848 (*Hydnum*, passable); Walty, Schweiz. Pilztaf. 3: pl. 64. 1947 (scales unusually small).

DIAGNOSTIC CHARACTERS.—Pileus scaly from the beginning, scales very coarse, fleshy and almost erect in centre of pileus, gradually passing into membranous to fibrillose, adnate squamules on margin, eventually almost disappearing (in wet weather?), bistre to purplish fuscous on grey-brown ground colour, with blackening tips. Stipe stocky to slender, equal or broadening downwards, with blunt base, covered with fine velvety tomentum which may rupture into fibrils or minute squamules, glabrescent, whitish at top, grey-brown further below, fuscescent with age. Spines decurrent, eventually chocolate brown. Trama dingy white in pileus, fuscescent in stipe, not discolouring in KOH. Odour faint or none. Taste somewhat bitter and slightly acrid. Tramal hyphae with clamp connections.

HABITAT.—On acid sandy soils in woods of *Pinus*.

DISTRIBUTION.—Common in the eastern parts of the country.

ILLUSTRATIVE COLLECTIONS.—Drente: Diever, Berkenheuvel, 6 X 1954, *Miss M. Vaandrager* (L); Overijsel: Rijssen, 11 X 1953, *M. G. J. Meijer* (L).

AUTHENTIC SPECIMEN.—*Hydnum badium*, Vogesia (L 910. 256–1560).

EXSICCATI.—Fuckel, Enum. Fung. Nassov. ser. 1, 957 (*Hydnum;* L); Klotzsch, Herb. viv. mycol. 127 (*Hydnum;* L, PR); Kryptog. exs. vindob. 2108 (L, PR, both unrecognisable); Lundell & Nannfeldt, Fungi exs. suec. praes. upsal. fasc. 1–2, 68 (*Hydnum;* PR); Petrak, Fl. Bohem. Morav. exs. ser. 2 (1), 1839 (*Hydnum;* PR); Saccardo, Mycoth. ital. 809 (*Hydnum;* L, PR) & 1616 (*Hydnum;* L rather too fragmentary, PR); Sydow, Mycoth. germ. 1824 (*Hydnum;* L, PR).

In the group of fleshy Hydnums Persoon introduced *Hydnum badium* as a new species, which now strikes us as strange in view of the fact that he knew and described *S. imbricatus* well under the name of *Hydnum cervinum* (1796 and 1825). His comment, however, on *H. badium* (1825: 156) "... cum *H. imbricato* L. forsitan confusus" would suggest that Persoon was at least aware of the similarity. After examination of Persoon's material I have come to the conclusion that *Hydnum badium* is fully identical with *Sarcodon imbricatus*, but up to the present the name has caused considerable uncertainty.

Bourdot & Galzin (1928: 449) considered *S. badius* a subspecies of *S. imbricatus*. The most important difference from Persoon's specimen, which has tramal hyphae with clamp connections, would be that their material has no clamps.

On checking the specimens of "*badius*" in Herb. Bourdot (Iseure, entre les Robinets et la Ronde, IX 1889, legi *H.B.*, bois de chênes; no. 12261; PC), I actually did not find any clamps. This proves Bourdot's material to be different from Persoon's *Hydnum badium*, but to what species of *Sarcodon* it belongs I am unable to make out.

Bresadola, to whom small portions of the pileus of both the type and the authentic specimen had been sent on loan, described and depicted a *Hydnum badium* which at first sight may look different from his *H. imbricatum*, but the differences actually express the variability of *Sarcodon imbricatus*. The allegedly shorter stem and darker colour of *H. badium* are in fact non-essential differences. From the Botanical Museum, Stockholm, I received on loan three collections from Herb. Bresadola which are briefly discussed here.

1. "*Hydnum badium* Pers., Tregagna, 1893, misit Dr Massalongo," seen and approved by Lundell in 1948, consists of two specimens which I failed to identify with any of the existing Sarcodons. They do not resemble Bourdot's material. It appeared almost impossible to swell the hyphae of the trama, but in the few cases that the hyphae were not altogether collapsed and septa were clearly visible, clamps were absent.

2. "*Hydnum squamosum* Schaeff. (*squamosum* crossed out and re-written in pencil *badium* Pers.), In pinetis, Margone, Villa Salvadori, Nov. 1898, leg. *J. Bresadola*," to which Lundell in 1948 had added a label "Mihi ignotum (*non Hydnum badium* Pers.)," consists of three specimens, one of which might have been used for Bresadola's Plate 1038. This collection represents *Sarcodon imbricatus;* the hyphae have clamp connections.

3. "*Hydnum squamosum* Schaeff. = *Hydnum badium* Pers., Sopramonte, sub *Pino sylv.*, Oct. 1899, Leg. *J. Bresadola*," to which Lundell in 1948 had added a label "Mihi ignotum (*non Hydnum badium* Pers.)," consists of three specimens. This collection also is *Sarcodon imbricatus;* the hyphae have clamp connections.

Lundell originally (1936: 25) considered *Hydnum badium* synonymous with *H. subsquamosum* Fr., but later on changed his opinion (1947: 47) after having found a species that was clearly distinct from *H. badium* and which he took to be "both the true *H. subsquamosum* of Fries and the fungus, of which he later described a clustered form as *H. versipelle*." On asking Dr Lundell what exactly *H. subsquamosum* looked like and in what respects it would differ from his "*H. badium*," I received a letter, the gist of which is that (1) there is no material of *H. subsquamosum* in Fries's herbarium, (2) the species was unknown to Romell, (3) the description by Fries might cover both his later *H. versipelle* and "*badium*" sensu Lundell, (4) *H. versipelle* is being maintained as a good species, and (5) the name *H. subsquamosum* had better be abolished altogether. On other grounds I have come to the same conclusion, see p. 49–50.

I examined the following collections of the species which Lundell took to be *Hydnum badium:* Lundell & Nannfeldt, Fungi exs. suec. praes. upsal. 252 (*H. subsquamosum;* C, PR); Upland: Upsala-Näs parish, W. of Högby, 22 IX 1951, *H. Smith*, det. Lundell (*H. badium;* L); Upland: Börje parish, "Klista skog" near Upsala, 11 VIII 1953, *J. Eriksson*, det. Lundell (*H. badium;* L). These collections clearly belong to one and the same species, resemble Massalongo's specimens in Herb. Bresadola, but do not fit the descriptions of any of the

European or North American Sarcodons. They come, however, very close to the following collections of *Hydnum versipelle* I have had on loan: Upland: Börje parish, "Klista skog" near Upsala, 6 IX 1945, *S. Lundell* (UPS); Upland: Börje parish, "Klista skog," 11 VIII 1953, *J. Eriksson*, det. Lundell (UPS). In fact, one of the specimens of "*H. badium*" (of the Högby collection) is so similar to those of *H. versipelle* (collected in 1945) as to be almost identical. "*Hydnum badium*" sensu Lundell and *Hydnum versipelle* (which in the present paper is considered synonymous with *Sarcodon bubalinus*) have in common the lack of clamps in the tramal hyphae, but differ as follows, as far as could be made out from the dried material. In the former the pileus is clearly fibrillose-squamulose with the scales having the tips upturned (although in the case of one of the Högby specimens already mentioned the scales are inconspicuous and scanty, leaving an almost smooth pellicle); the colours are of a dull yellow and brown, fairly well resembling those of Bresadola's Plate 1038 of *Hydnum badium*, but without the purplish hue, and not turning blue-green in KOH. In the latter the pileus shows a homogeneous smooth cuticle which from the centre outwards may become ruptured into areoles or innate scales; the colour is fairly pale pinkish brown to purplish brown, in between Séguy 132 and 162 with a touch of 703, approaching rather Fries's plate of *H. versipelle* (Icon. sel. Hym. **1**: pl. 1. 1867) than that of Bresadola (pl. 1040) which is by far too yellow; the areolate centre may become sepia with some purplish tinge; the paler parts of the pileus turn blue-green with KOH, which is equally well visible macroscopically and microscopically.

Having satisfied myself that even the nearest relative, *Hydnum versipelle*, is clearly distinct, I am convinced that "*Hydnum badium*" sensu Lundell is an undescribed species, the description of which, however, has to be left to the mycologist who will have access to the fresh material.

Ellis, North Am. Fungi 926 (*H. imbricatum*), as far as the Leiden specimen is concerned, is not *Sarcodon imbricatus*, since the tramal hyphae lack clamps. In this connection it is of interest to note that already Banker (1906: 146) pointed out that this exsiccate "appears to be made up of different things some of which may constitute a distinct species."

The trama of the present species is generally stated to be whitish in the pileus, but in rare cases, as in the above mentioned collection from Rijssen, it is very faintly tinted with vinaceous which turns olive green with KOH. Presumably Greville (1824: 71) and Rea (1922: 632) are the only authors to have described the flesh as "pale buffish or reddish."

SARCODON LAEVIGATUS (Sw. ex Fr.) P. Karst.

Sarcodon laevigatus (Sw. ex Fr.) P. Karst. *in* Rev. mycol. **3** (No. 9): 20. 1881 & *in* Medd. Soc. Faun. Fl. fenn. **6**: 16. 1881. — *Hydnum laevigatum* Sw. *in* Kgl. VetAcad. nya Handl. **31**: 243. 1810; ex Fr., Syst. mycol. **1**: 399. 1821. — Type: probably non-existing, see Banker (1913: 14). — Type locality: Sweden, vicinity of Stockholm ("Funnen i Barrskogar kring Stockholm").

Hydnum leucopus Pers., Mycol. europ. **2**: 158. 1825. — Type: *Hydnum leucopodium*, misit Chaillet, "*Hydnum laevigatum* Fr." (L 910. 262–524).

DESCRIPTIONS.—Coker & Beers, Stip. Hydn. east. U.S. 49. 1951; Lundell *in* Lundell & Nannfeldt, Fungi exs. suec. praes. upsal. **45–46**: 2. 1954.

ILLUSTRATIONS.—Barla, Champ. Prov. Nice, pl. 38, fig. 5–6. 1859 (*Hydnum*,

probably good); Bresadola, Icon. mycol. **21**: pl. 1042. 1932 (*Hydnum*, pink colour of trama erroneous according to Lundell in letter, see remarks); Coker & Beers, Stip. Hydn. east. U.S. pl. 30. 1951 (photogr.); Fries, Sverig. ätl. gift. Svamp. pl. 81. 1860 (*Hydnum*, colour of pileus wrong); Konrad & Maublanc, Icon. sel. Fung. **5**: pl. 468. 1925–1935 (colour of pileus wrong, see remarks); Nikolajeva *in* Not. syst. Sect. cryptog. Inst. bot. Komarovii Acad. Sci. URSS **9**: fig. 4. 1953 (fairly good).

Diagnostic characters.—Surface of pileus smooth and glabrous, or becoming cracked into adnate, membranous scales, pale purplish grey-brown at first, greyish tawny later on with scales somewhat darker. Stipe frequently excentric to lateral, stocky, equal or broadened below with blunt base, finely tomentose with the tomentum collapsing into minute granules or fibrils, glabrescent, whitish or greyish suffused with faint tinge of pileus, becoming almost concolorous. Spines decurrent, finally chocolate brown. Trama stated to be white and unchanging on exposure (Lundell), or pale brownish, turning deeper brown on rubbing (Coker & Beers), not discolouring in KOH. Odour none, taste almost none (Coker & Beers). Tramal hyphae with clamp connections often of medaillon type. (Described after Swedish material.)

Habitat.—Reported to grow on acid sandy soil under *Pinus*, with or without an undergrowth of mosses or *Calluna*.

Exsiccati.—Fuckel, Enum. Fung. Nassov. ser. 1, 955 (*Hydnum;* L); Lundell & Nannfeldt, Fungi exs. suec. praes. upsal. fasc. 45–46, 2203 (*Hydnum;* C, PR, S, UPS) & 2204 (*Hydnum;* C, PR, S).

Bourdot & Galzin, Bresadola, and Konrad & Maublanc concur in describing (1) the flesh as white but becoming tinted with vinaceous on exposure, (2) the odour as nauseating, (3) the taste as bitter after a while. As I have not seen the present species in the fresh state, I prefer to follow Romell's and Lundell's tradition, as well as Coker & Beers's description that closely keeps to that tradition. Another reliable description is that by Barla (Champ. Prov. Nice, 79. 1859). However, this would leave the species as described by Bourdot & Galzin without a name. Judging from the description I would think their species to be quite close to, but perhaps not identical with, *Sarcodon excentricus* Coker & Beers (which, incidentally, lacks a Latin description). Renewed study of the extra-Scandinavian specimens will be needed before deciding upon the identity.

Sarcodon laevigatus in the sense of Bourdot & Galzin certainly belongs to the group of the true *S. laevigatus* and of *S. imbricatus* since the tramal hyphae possess clamp connections. I have seen the specimen which Bourdot used for completing his description (Herb. H. Bourdot, no. 39277, Champignons de Suisse, *Sarcodon laevigatum* (Sw.), Forêt de sapins du Jura Neuchatelois, Rare, *P. Konrad*, 1 sept. 1925; PC), and which to me seems to be part of the specimen as depicted in Konrad & Maublanc's Icones selectae.

Fries (1828: 130) regarded *Hydnum leucopus* of Persoon as synonymous with his *H. laevigatum*, but changed his opinion later on (1836–1838: 505, and 1874: 598), and listed the former under the synonymy of *Hydnum squamosum*, citing Schaeffer's Plate 273 as typical of that species. I am not prepared as yet how to interpret this plate. Bresadola's concept of *Hydnum squamosum* (Pl. 1036), if it may be pointed out here, does not resemble in the least Schaeffer's plate,

and, since I have not examined any material from Herb. Bresadola, I am equally unable to identify this species. Remarkably enough, we possess a collection from Hulst (province of Zeeland) which with regard to the macroscopical features is very similar to *H. squamosum* sensu Bres., at the same time differing from the species of group 2 – to which it belongs – in the trama becoming flushed with vinaceous on exposure.

Oudemans (1892: 400, and 1904: 123) mentioned the present species for The Netherlands, but in the absence of any material, I must refrain from accepting the record.

SARCODON SCABROSUS (Fr.) P. Karst.

Sarcodon scabrosus (Fr.) P. Karst. *in* Rev. mycol. **3** (No. 9): 20. 1881 & *in* Medd. Soc. Faun. Fl. fenn. **6**: 16. 1881. — *Hydnum scabrosum* Fr., Anteckn. öfv. i Sverige växt. ätl. Svamp. 62. 1836 (n.v.). — Type: not known to be in existence. — Type locality: Sweden, Smoland, Femsjö, "In pinetis montanis raro" (Lindblad, Syn. Fung. Hydn. Suec. nasc. 5. 1853).

DESCRIPTION.—Lundell *in* Lundell & Nannfeldt, Fungi exs. suec. praes. upsal. **45–46**: 3. 1954.

ILLUSTRATIONS.—Bresadola, Icon. mycol. **21**: pl. 1039. 1932 (*Hydnum*, colour of pileus incorrect); Fl. batava **19**: pl. 1475. 1893 (*Hydnum*, uncertain); Michael-Schulz, Führer Pilzfr. **3**: pl. 304. 1927 (*Hydnum*, colour of pileus and spines incorrect); Pouzar *in* Česká Mykol. **10**: fig. 1 & 2, 1956 (*Hydnum*, photogr.).

DIAGNOSTIC CHARACTERS.—Pileus felted at first, becoming squamose, scales coarse in centre of pileus, finer and more fibrillose outwards, purplish brown to paler or darker fuscous suffused with vinaceous on yellowish brown to concolorous but paler ground. Stipe stocky to slender, equal or tapering downwards, finely felted, tomentum rupturing into fibrils or minute granules, or glabrescent, greyish and not infrequently also tinted with vinaceous, becoming concolorous with pileus but paler, blackish or olivaceous black-green at base but often concealed by whitish felt. Spines decurrent, finally chocolate brown. Trama whitish or faintly tinted with bistre, becoming suffused with reddish or vinaceous, greyish green to blackish in base of stipe, discolouring bluish green in KOH. Odour variable, either ill-defined or of cucumber or pleasantly sweetish. Taste equally variable, almost none at first, becoming tardily bitter, or immediately bitter and with a long remaining acrid-scratchy sensation in the throat. Tramal hyphae without clamps.

HABITAT.—On acid sandy soil in deciduous (*Quercus*) or mixed (*Quercus, Fagus, Pinus, Picea*) woods.

DISTRIBUTION.—Not uncommon in the eastern parts of the country.

ILLUSTRATIVE COLLECTIONS.—Friesland: Beetsterzwaag, Wijnjeterperweg, 14 IX 1954, *Mrs E. Kijlstra* (L); Noord-Brabant: Ulvenhout, Ulvenhoutse bos, 25 VIII 1953, *C. Ph. Verschueren* (L).

EXSICCATI.—Lundell & Nannfeldt, Fungi exs. suec. praes. upsal. fasc. 45–46, 2205 (*Hydnum;* C, PR, S) & 2206 (*Hydnum;* C, PR).

The striking diversity in the appreciation of both odour and taste of the present species seems worth-while mentioning. Lundell (1954: 3) states the smell to be faint, indifferent, and the taste "as a rule very acrid." The very acrid taste is also stressed in a collection from Sweden (Norrbotten: Över-

torneå sn, S. Orjasjärvi, 5 IX 1954, *O. Lönnqvist*, det. Lundell; UPS). On checking the taste of a fragment of the pileus of this material, I found it very bitter followed by a disagreeable, scratchy sensation in the throat. A similar taste was experienced in two more Swedish collections (Upland: Älvkarleby sn, Ytterboda, 23 IX 1950, *G. Fåhraeus* & *G. Stenlid;* Hälsingland: Harmånger sn, Strömsbruk, between Påboda and Andratjärn, 4 IX 1949, *B.* & *J. Eriksson*, both det. Lundell; UPS). None was acrid properly speaking, like in certain species of *Lactarius* and *Russula*, but the character could have gone lost in the process of drying. Strikingly different was a fourth collection, also from Sweden (Dalarne: Rättvik sn, between Nittsjö, Tövåsen and Granmor, 18 VIII 1953, *M. Tengstrand*, det. Lundell; UPS) in having a mild taste. All have in common that they were collected in coniferous woods.

Of the few indigenous collections I have seen in the fresh state, one (collected under *Quercus rubra* and *Pinus silvestris*) smelled sweetish when fresh (taste not noted) and tastes mild when dried. Another collection (from a mixed grove of *Fagus* and *Picea*) smelled somewhat sweetish, and tasted very bitter and acrid when fresh, but has no taste at all in the dried state. Two other collections agree in having been collected under *Quercus*. Both tasted of bitter cucumber when fresh, and were somewhat bitter when dried, but differ in that one of them smelled of cucumber, the other being aromatic and reminiscent of anise.

Fries (1874: 599) cited Schaeffer's Plate 271 as typical of his *H. scabrosum*, but I am at a loss how to identify Schaeffer's *Hydnum striatum*.

In this country *S. scabrosus* has been confused with *S. fennicus*.

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OBSERVATIONS ON GASTEROMYCETES—4

Studies on Type Material No. 2: Geastrum badium Pers.

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(With 3 Text-figures)

The authentic specimen in the Herb. Persoon, Leiden, is described and designated as Type. Collections from Scotland and Holland are compared with the Type and the literature is reviewed. *G. elegans* Vitt. and *G. umbilicatum* Fr. are considered synonyms.

Technique.—Micro-characters have been examined in Erythrosin B in 10% Ammonia, see Palmer (1955). All drawings are freehand with components measured using an ocular micrometer. The formulae show minimum, average and maximum measurements to the nearest 0,5 μ.

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Persoon's diagnosis and authentic specimen.—Persoon (1809) published *Geastrum badium* with the following comment: "M. Thuillier a trouvé cette espèce dans le Bois de Boulogne; elle est un peu plus petite que le geastre pectiné auquel elle ressemble d'ailleurs; mais son péridie n'a point de pédicelle; elle est, ainsi que ses rayons qui sont au nombre de 5–6, d'une couleur de marron obscur et un peu luisante." He gave no figure.

In his herbarium in the Rijksherbarium there is a single specimen (L 910, 261–756) annotated in Persoon's handwriting: "Geastrum *badium* Pers. Mémoire, Journ. de Bot. v. 2." as well as "Geastrum spadiceum Hb. Pers. ded. Tode, Mycol. Europ. t. 3. f. 2." The legend "Geastrum pectinatum: majus" is in another hand and, according to a label dated Dec., 1924, Kits van Waveren determined it as *G. pectinatum*.

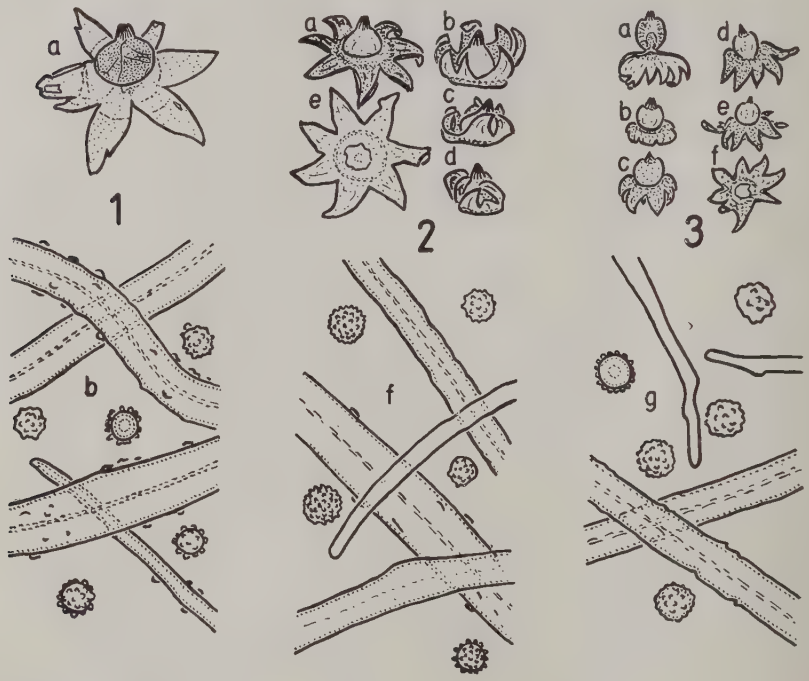
Reference to Persoon (1822) found that the herbarium specimen closely resembles Plate 3, figure 2, and of which it is probably the original. The Mycologia europaea was never completed and Plate 2, figure 3 has no title; neither is mention made of either *G. badium* or *G. spadiceum* in the text.

Discussion.—From the evidence available, this specimen is what Persoon called *G. badium* in 1809 but, like many of the old botanists, it seems that he later decided to call it *G. spadiceum*. However, *G. spadiceum* appears to have been only an herbarium name and not validly published. Consequently, *Geastrum badium* Pers. is the legitimate name for this species and Specimen No. 910, 261–756 in the Herbarium Lugduno-Batavorum is formally designated as the Type.

TYPE SPECIMEN (L 910,261–756).—A single specimen firmly glued to a sheet of paper.

Exoperidium 5.5 × 4.5 cm., somewhat saccate, divided into six acuminate, ragged, thin and papery rays extending about two-thirds to the centre. *Mycelial layer* obscured by the specimen being glued to the paper. *Fibrillose layer* smooth, thin and papery, sepia. *Fleshy layer* absent. *Endoperidium* 1 × 1.8 cm., flattened but seems to be sessile, dark brown to purplish, depressed globose. *Mouth* 4 × 7 mm., tapering upwards to 2 mm., prominently sulcate but merging at the base of the sulcations into the Endoperidium, brown. *Gleba* brown. *Capillitium* coloured, aseptate, simple, occasionally rough with adhering debris, central lumen faintly apparent, up to 9 μ thick, tapering at ends to 1.5 μ. *Spores* coloured, mainly globose, contents indistinct, rough to coarsely verrucose, infrequently bearing a short pedicel stump, thick-walled, 3.5–4.5–6.0 × 3.5–4.0–4.5 μ; with verrucae 3.5–5.0–6.0 × 3.5–5.0–6.0 μ.

TYPE LOCALITY.—Bois de Boulogne, Paris, France.



Figs. 1–3. *Geastrum badium* Pers.

Fig. 1. Type specimen: *a.*—single specimen ½ × ; *b.*—Spores and Capillitium 1000 ×.

Fig. 2. Scottish specimen: *a–d.*—single specimen varying from fully expanded with rays slightly recurved (moist) to rays tightly incurved (dry) ½ × ; *e.*—underside of Exoperidium showing basal scar ½ × ; *f.*—Spores and Capillitium 1000 ×.

Fig. 3. Dutch material: *a.*—section of weathered specimen ½ × ; *b–e.*—freshly expanded specimen varying from moist (rays recurved) to dry (rays incurved) ½ × ; *f.*—underside of the freshly expanded specimen showing basal scar ½ × ; *g.*—Spores and Capillitium 1000 ×.

SCOTTISH MATERIAL.—A single specimen was collected at Whitberry Point, Tynninghame, E. Lothian, Scotland, on the 5th October, 1909, now in Herb. Edinburgh, and was recorded as *G. striatum* DC. by Evans (1909).

Exoperidium showed prominent hygroscopic tendencies: whilst the rays were incurved when dry, they expanded within a short period when moistened and became slightly recurved. *Exoperidium* of a thin, leathery texture, but not the hard, woody nature so characteristic of the truly hygroscopic series of *Geastrum*. *Mycelial layer* ochraceous brown, slightly sand-encrusted and persistent, except at the base where a scar shows the original point of attachment. *Fleshy layer* desiccated, thin, adnate, dark reddish-brown. *Endoperidium* sessile, smooth, broadly attached below, with a 4.5 mm. tall, deeply plicate *Mouth*, which merges into the adjoining Endoperidium. *Capillitium* coloured, aseptate, simple, somewhat nodular with faint traces of a central lumen, 1290–1700 μ long, up to 8.5 μ thick and tapering at ends to 1.5 μ. *Spores* coloured, globose to subglobose, punctate with short, spinose warts, 4–5–5.5 × 4–4.5–5.5 μ, with verrucae 4.0–5.5–6.0 × 4.0–5.5–6.0 μ.

DUTCH MATERIAL.—C. Sipkes made a collection in January, 1913, on the dunes at Zwarteveld, Overveen, prov. Noord-Holland, which Kits van Waveren (1926) records as *G. badium*.

Two specimens from this gathering have been examined: one was freshly expanded and the other was weathered at the time of collection. *Exoperidium* 1.5 × 2.5 cm., vaulted, with a basal scar, somewhat saccate, with subhygroscopic rays similar in texture to the Scottish specimen but tending to be slightly incurved when dry and recurved when moist. *Mycelial layer* cream-coloured and sand-encrusted in the freshly expanded specimen with the *Fleshy layer* forming a dried-up, adnate, reddish-brown stratum. *Endoperidium* sessile, smooth or minutely furfuraceous with a 2 mm. tall, sulcate *Mouth*, seated in a slightly depressed area, and an ovoid, 5 × 3 mm. *Pseudocolumella*. *Gleba* brown. *Capillitium* coloured, aseptate, simple, usually with visible traces of a central lumen, 860–1260 μ long, up to 7.0 μ thick and tapering at ends to 1.5 μ. *Spores* coloured, globose to irregular, with an occasional central guttule, rather inconspicuously verrucose, 4.5–5.0–6.0 × 3.5–4.5–5.5 μ, with verrucae 5.0–5.5–6.0 × 4.5–5.5–6.0 μ.

LITERATURE AFTER PERSOON.—Fries (1829) described his *G. umbilicatum* with a sessile Endoperidium and sulcate Mouth which, he stressed, was seated in a depressed area.

Vittadini (1843) delineated *G. elegans* with a sessile Endoperidium and indeterminate sulcate Mouth, citing *G. striatum* Fr. "peridium in hoc subpedicellatum" and *G. badium* Pers. as synonyms.

Morgan (1889) listed *G. umbilicatum* Fr., which he characterised as having a sessile Endoperidium, a sulcate Mouth seated in a circular, depressed, marginate disc and globose, minutely warted Spores, 3.5–4 μ diam.

Hollós (1904) gave *G. umbilicatum* Fr. with a sessile Endoperidium, sulcate Mouth and Spores 5–6 μ diam. His figures are similar to the Overveen material. He discussed the literature and considered the mouth structure to be a variable character. He adopted Fries's name as he thought Persoon's diagnosis for *G. badium* to be insufficient to determine the species meant.

Petri (1909) published *G. elegans* with a sessile Endoperidium, indeterminate, sulcate Mouth and Spores 4.5–5 μ diam., citing both *G. badium* and *G. umbilicatum* sensu Hollós as synonyms.

Rea (1922) reported *G. umbilicatum* with sub-hygroscopic rays (tips incurved when dry), Endoperidium sessile, appearing slightly pedicellate when dry, with the Mouth seated in a depressed area, and Spores 4–6 μ diam. It is possible that he had material covering more than one species.

Kits van Waveren (1926) recorded the Overveen collection and described *G. badium* with a sessile Endoperidium and Spores 4.5–6 μ diam.

Coker & Couch (1928) discussed *G. umbilicatum* sensu Morgan but, from their description, this species probably belongs to the hygroscopic series. Under *G. schmidelii*, they wrote that *G. elegans* was very near but differed by its sessile Endoperidium and larger Spores.

Long & Stouffer (1948) described *G. elegans* with a non-hygroscopic Exoperridium, vaulted base with no umbilical scar, sessile Endoperidium and Spores 5–7 μ diam. They distinguished between strongly hygroscopic, sub-hygroscopic and not hygroscopic.

CONCLUSIONS.—The author prefers to consider *G. badium* as having a sulcate Mouth, sessile Endoperidium and Spores ca. 3.5–6 μ diam., not including the verrucae. However, it would appear that the Dutch collection would be referred by some authors to *G. elegans* Vitt.

Whilst it is unwise to form conclusions without having examined authentic specimens, *G. elegans* Vitt. and *G. umbilicatum* Fr. appear to be synonyms. The character of the Mouth being seated in a depressed area, used for distinguishing *G. umbilicatum*, is unsatisfactory. Although only a few specimens of *G. badium* have been examined by the author, abundant collections of *G. nanum* in England, which typically has such a Mouth, show this to be a very variable criterion.

The subhygroscopic nature of the rays of the Scottish and Dutch fungi, whilst striking, should not be given undue importance. All geasters are hygroscopic to some extent, but the hard, woody rays with the persistent, horny Fleshy Layer of the hygroscopic series are unmistakable.

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